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BIO-TECHNOLOGY: PROMISES AND PERILS

**Edited by
Felix Wilfred**

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A JOURNAL FOR SOCIO-RELIGIOUS RESEARCH

Bio-Technology: Promises and Perils

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Editorial

While this particular issue on biotechnology was in its final stage of preparation, tsunami tragedy struck, creating immense devastation. *Jeevadhara* cannot be silent on this natural calamity that has caused over two hundred and fifty thousand deaths and about five million displaced people. Hence the very first article is devoted to a critical reflection on this catastrophe. This article on tsunami is entitled "Honour to the Dead and a Warning to the Living". Among other things, tsunami raises the question on the failure of technology to protect the poor, while it is made to serve the interests of those who have the means.

The following two articles by Radha Ramachandran and Mathew Chandrankunnel explain the biotechnological practices relating to human reproduction, surrogacy, therapy and so on, and present us the deeper ethical and human issues involved in them. They bring out in a special way the condition of women under new biotechnology. Though there may not be clear-cut solutions to all the ethical questions, what is important in each case is the respect and dignity to human beings, especially women who are vulnerable and could be easily victimized. It is argued that the perspectives of women and their experiences should be involved in biotechnology and research, since these touch them directly.

The issue moves on from human biotechnology to plant-biotechnology. The question is broached through a case study. Ilina Sen examines the decentralized and sustainable food security systems that have traditionally existed in the forest areas of Chhattisgarh. She shows how these systems are relevant, and provide workable solutions for today. She also brings out the important role of women in food security, and concludes with some policy recommendations. This experience offers a lot of food for thought on such questions as genetically modified food through technological means.

Further the current issue leads us into marine biotechnology, yet with another case study. The scope and participation of women in sea farming/aquaculture production in a particular area is influenced to a

large extent by the level of available technology *vis a vis* the role and status of women in that society. Development of technological design that would suit women's needs and physical capacity will boost up the role of women in this sector. Remany and her colleagues from the National Institute of Ocean Technology, Chennai, have contributed this article.

The final two contributions of Panneerselvam and Sreekala Nair take us deeper into the theoretical, social, and epistemological issues underlying biotechnology. They tell us how the choice of theories as well as particular technologies does not take place in a vacuum; they are largely conditioned by the social location of the researchers and their value commitments. In this context, both authors discuss some of the significant contemporary authors, and bring out a clear feminist approach that is very important today to the whole question of biotechnology.

Except the first article, all the other articles were originally presented as papers at the National Conference organized on the theme of biotechnology, by the Department of Christian Studies, University of Madras, during 15 & 16 December 2004. Personally it has been a great experience for me to organize this conference and bring scholars from different disciplines together for common study and discussion on the promises and peril biotechnology presents. This issue carries selected papers from the conference, and it is gratifying that many women scholars have contributed to the conference and their papers are brought out in this January issue of *Jeevadhara*.

I wish to thank very sincerely all the contributors for reworking on their papers for publication in *Jeevadhara*, and express my appreciation for their serious commitment to the respective issues they are dealing with. Dr Pushpa Joseph, post-doctoral fellow in the Department and my former student, has been the driving force behind the conference for which she functioned also as the co-ordinator. She has been so very generous to assist me in editing the papers appearing here. Without her hard work, unstinting support and commitment this issue would not have come to light. Ms Remy Joseph deserves a word of special thanks for her most efficient secretarial assistance, her wisdom and reassuring ways, which made the editing of this issue of *Jeevadhara* possible, in spite of my attending at the same time to too many irons in the fire!

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Felix Wilfred

Honour to the Dead and a Warning to the Living

Coming to Terms with Tsunami

Felix Wilfred

"Honour to the Dead and a Warning to the Living". These are the words I found written beneath the statue of a prisoner standing in former Dachau concentration-camp. The bronze statue represents all those innocent people killed by the man-made horror and tragedy of Nazism. These words were ringing in my ears in the afternoon of 26 December as I went from village to village in the coastal areas of Kanyakumari district, Tamilnadu, to see the devastation and havoc of the tragedy. Here is a catastrophe caused by the fury of nature. It comes as well as a warning to humanity to set its home in order.

We deeply mourn the death of over 150 thousand people and honour their memory. Most of them are among the poorest of the poor in Indonesia, Thailand, Sri Lanka, India and all the way in West Africa. Thousands of people were buried without the minimum honours every culture reserves for the dead. There were no individual graves. They were buried as one among many in mass graves, often unseen and unidentified even by the closest of relatives. Not in few cases, there were really no one to honour them or identify them, because entire families were wiped out along with their homes and possessions.

The irreparable loss of the dear ones has left deep pain, anguish, desperation and trauma in the survivors. The plight of the survivors is the case of "the living envying the dead"... The magnitude of the tragedy is to be measured also in terms of the five million displaced people and families. Many of them live in crammed camps, facing the threat of epidemics, with poor sanitary conditions. Hardest hit perhaps were the Banda Aceh, the provincial capital in Indonesia, the various parts of Sri Lanka and the Andaman and Nicobar Islands of India. The highest number

of loss of life has been reported from Indonesia with over one hundred thousand dead. About seventy percent of the people in Banda Aceh lost their lives. In Meulboh fifty percent of the people in the town fell victims to the killer waves.

With their dear ones gone, and their means of livelihood like the boats and catamarans shattered to pieces and swept away by the swirl of the tsunami waves, the survivors face a bleak future with little prospects. While we honour the dead and are in solidarity with the anguishing survivors, we need to take the tsunami disaster also as a serious warning. Here is an occasion to radically rethink the shape of our world and societies, its relationship to nature, its model of development, choices and priorities.

The Human Dimensions of the Calamity

The loss of so many dear ones, and in many cases the wiping out of the entire family has left the victims inconsolably grief-stricken. The dear ones have been snatched away from them within seconds, and seeing them vanishing, never to be seen again has left deep trauma in the survivors. Many fishermen and women have lost not only their boats and catamarans, but also their children – the human saplings, the insurance for their lives and for old age. According to some estimates, the number of children dead would be around 50, 000. The death of so many children means loss of future. On the other hand we have large number of children who have been orphaned, deprived of their loved fathers and mothers, brothers and sisters. In the case of children the security of the family and of their familiar setting is important for their growth, the absence of which is bound to create trauma in them. These are some of the experiences the victims are struggling to cope with, and they will need so much of love, attention, support and care before they could retrieve their bearings.

In relief and rehabilitation work this deep human reality tends to be forgotten. While people require the material things, for all of them what is more important is strength and courage to face the situation that seems to have shattered all prospects of future. The victims will need a lot of listening, consolation and people who could empathize with them and be in solidarity. Many of them are still in relief camps having lost their homes without any trace, and with nowhere to go, and none to fall back upon. We are in the face of people who were deprived of the

opportunity to mourn their dear ones and bury them, carrying deep in them a sense of guilt. Money cannot solve all the human problems. This truth is nowhere more evident today than among the tsunami victims. This is something the generous donors both in the country and abroad should realize.

Providing food, clothing and shelter is a response only to a small part of the tragedy, while the larger part will continue to haunt the victims for a long time. When a mother, as it happened in Nagapattinam, was trying to hold together tightly her four daughters, and sees the futility of her efforts when the roaring waters snatch all of them from her embrace, the sense of loss of vacuum and deep pain of this mother, no amount of relief work could make good. Being in relief camps with large number of people may for sometime cushion them from the full human impact of this tragedy. But when they move out of these camps, the magnitude of the loss will come down on them crushing.

Speaking of the human dimension, I should mention also the general sense of fear that has gripped the victims. For centuries and millennia the fishermen have braved the seas and knew how to negotiate it when it turned rough. They were out of wits on 26 December in the face of tsunami, and became helpless like others when the fury of the waves overturned even heavy trucks and cars on the shore and tossed them around as little toys. I live hardly three hundreds yards from the sea, and I see the fishermen in these days sitting on the shore gazing at the sea that let them down, and at times mending the tangled nets they managed to salvage. For the first time in living memory, the fishermen are afraid of the sea – the sea they looked at as the source of their livelihood and as the defining element of themselves. The disaster has led them to view the sea in a different light now.¹

United in Disaster

The national borders do not seem to have anything to do for tsunami that hit the victims without any distinction. But as in almost all natural calamities, the poor have been the worst affected, and in large numbers too. We are in the face of a tragedy that has unveiled how the destiny of human beings is bound together. Waves of discussions and debates

1 The fear has gripped also those elites who cared to have their villas and holiday houses close to the sea and prided themselves of their privileged sea-facing resorts.

were generated by globalisation as the epicentre. How and to what extent our world is one is no longer a matter of debate. Everything was dwarfed by the giant tsunami waves that hit the countries around the Indian Ocean. India has known the Bhopal tragedy, Gujarat earthquake and Orissa floods. Here is a disaster it shares with other countries of the rim of Indian Ocean. The scene of havoc is the same whether it is Indonesia, Thailand, Sri Lanka or India; the problems faced are similar. Yes, the earth is one; the humanity is the same wherever it suffers. The global character of this tragedy is seen in the thousands of deaths among foreign tourists hailing from different countries, with Sweden, Germany, Italy counting most numerous victims and missing people.

The bondedness of human beings is so deep that religious distinctions cannot stand in the way. This was proved in innumerable stories of assistance to the victims starting from the very moment of the disaster. The victims were the first ones to help other victims with no consideration of caste or creed. Though organizations may be religious (Hindu, Christian, Muslim, etc), they all went beyond religious affiliation to help out anyone in need. The well-known *dharga* of Nagur near Nagapattinam in existence for the past 480 years permitted for the first time corpses of Hindus to be buried in its cemetery – so also those of Christians, without any distinction. Christian schools and institutions became the haven of protection for people of all religious traditions at the time of crisis. In Kanyakumari district a Hindu leader opened his Kālyanamandapam for the Catholics who fled fearing the tsunami waves. The same kind of experience was there in other affected countries. In east of Sri Lanka, for example, the traditional ethnic and religious divide between Muslims and Tamils were set aside. The Muslims fed the Tamil victims and offered them protection.

The manifestation of this solidarity is a sign of hope. We would only wish that this does not become an ad hoc expression at times of catastrophies, but remains as an abiding culture and way of life. Religions need not be woken up to this basic humanity in all of us only with rude shocks and disasters. When corpses started rotting there was no difference between the high and the low caste. The stench was the same. The absurdity of man-made purity-pollution could not be anywhere more in evidence. Is it not a lesson also for the religions to get out of dehumanising caste distinctions based on purity and pollution?

Tsunami – The Curtain-Raiser of Contradictions

The ugly face of our society and the world which were hidden behind the curtain are now exposed by the tsunami. To begin with, tsunami disaster has exposed the contradictions of the present Indian economy, and the global economy at large. In the past few years, the critique of the poor and the marginalized on the economy that deprived them of the basic necessities of life were countered by the pontiffs of neoliberalism saying that they knew better how to steer the country to true development and prosperity. The tsunami tragedy has shown that the country has plenty of financial resources. Things were certainly different some fifteen years ago. Money seems to be readily available, if we note how rich individuals and corporations vie with each other to donate for the relief of the victims.

This picture of a financially strong side manifested at the time of crisis is in stark contradiction to the situation of daily life in which the poor find themselves deprived of basic health care, food, employment, etc., which are all so very necessary for a dignified human life. As Amartya Sen has noted in a recent interview, the chronic malnutrition especially of children in India is very high – to the level of 40 – 60 percent. In terms of comparison it is higher than even Sub Saharan Africa where malnutrition of children is 20 - 40 percent.² What kind of economy is it that allows millions of children to starve and claim at the same time that the economy is strong? Whose economy is it any way, and for whose benefit, and how is the strength of an economy measured?

Another area of contradictions is in the field of technology. Tall claims are made about the technological developments in India, and Asia at large. Biotechnology is projected as the most important innovation in the decades to come with a lot of prospects. Millions are being spent in Asia for research and adoption of technology. With all that India and other affected countries like Thailand, Sri Lanka and Indonesia have not been able to protect the poor from falling prey to the waves. The high level of technology adopted for industrial purpose contradicts the lack of minimum technological involvement in protecting the poor. This is true as much of India and Asia, as the rest of the world.

Let us take, for example, the case of communication technology. Our world is today characterized as “global village” primarily because of the swiftness of communication that binds its different parts. Computer jargons and communication buzz words fill the air. And yet, when it was a question of protecting the lives of the poor victims who lost their lives in tsunami, the communication miserably failed. There was no proper communication infrastructure or contingency plans to evacuate the people in times of emergency. More than two hours elapsed after the waves struck Nagapattinam and Chennai at the Bengal coast, before the killer waves reached Kanyakumari. In this district in which almost one thousand people were killed – many of whom are children - lives could have been saved with a lot more alertness, and if things were communicated and emergency plans were put in place. Some survivors told me that at the coastal villages people were in fact watching on TV about the havoc in Nagapattinam and Chennai. Where was technology and communication at that moment? Where were the experts? Their ineffectiveness at the moment to foresee the effects and warn the people did not happen with such disastrous consequences.

We need to think about the contradictions in the matter at the global level. Technology has become a means to protect exclusively the lives of only those who can afford, and not of the poor men, women and children. I am referring to Pacific Ocean’s Tsunami Warning Centre in which 26 countries of the Pacific Rim, including North America and South America form part. These countries exchange among themselves informations about tsunami. There seems to be sufficient evidence to the report that the tsunami would hit the countries around Indian Ocean was known, and yet this information was not passed on, since these countries do not form part of the “club” of countries having the tsunami warning system. If such is the case – as seems to be with more and more evidence coming to light - this poses serious questions about the moral culpability. That they could risk the lives of thousands of poor fishermen and women by withholding vital information of safety turns them into heinous murderers of no lesser grade than war criminals. Even assuming that there were efforts to communicate the imminent danger, the communication networks simply failed. What an irony that this should happen in a world that boasts of “communication revolution”! Whatever communication and warning there was, it was “too little, too late, for too many”.

What we find is that technology could be killing for its nefarious effects. There is also the other aspect of its killing by monopolizing it and turning it into an instrument of the privileged. Racism, purity-pollution, hierarchy are some of the traditional forms of discrimination. Technology has joined this infamous list. It is made to serve differently the high and the low, the rich and the poor. The tsunami has raised the curtain for all of us to see this ugly aspect of a pro-rich oriented technology in the global world, and its atomised high specialization with none in charge. It is reported that one of those who from the warning system picked up the signals of what was happening beneath the ocean, did not pass it on simply because, as he said, it was not his job! ³

Tsunami and the Environment

Something should be learnt out of this horror on our relationship to environment. Tsunami is a wake-up call to things even worse that could befall our earth through global warming. This is not a danger that we could comfortably postpone to think of later. It is already in the process, and the results could be catastrophic and apocalyptic in nature. Flooding of the earth by the seas like in the Biblical narration of the flood by rain in Noah's time, is something that the consumer world is creating. Today's unbridled consumerism is tomorrow's flooding, if what the experts are telling about the global warming is true – as seems to be the case more and more. "The greatest polluter of the earth", the US does not seem to be concerned about it seriously as it may affect its present affluent lifestyle. How strange that this imperial power is refusing to sign the Kyoto protocol limiting carbon emission. The poor of tomorrow will be paying for this senseless disregard for the future. It is reported, for example, the Swiss Insurance firm Swiss Re has paid about hundred billion dollars as claims connected with natural disasters in the year 2004 alone.⁴ If we take into account the millions of people who are not covered by any insurance in the developing world, and the damages they have suffered, the picture of the extent of natural calamities affecting us is simply staggering.

3 This is what was reported by that person in BBC Radio 4. See *The Independent*, 2 January, 2005.

4 Cf. *The Independent*, 27 December, 2004. One needs to only think of the hurricanes that struck the Florida or the typhoons and calamitous weather that visited Japan in the year 2004.

One thing that tsunami made clear is that it is not effective where there existed ways and means of protection. It is said that Andhra Pradesh in India was not affected by the tsunami because of the mangroves which serve as a buffer and protective device against the onslaught of the waves. Similar measures taken in Vietnam has served as protection for the people of Mekong delta. Such measures need to be intensified in areas prone to natural calamities, and thus ensure most effective ways of minimizing casualties at the time of crisis.

Tsunami is a rare phenomenon, and we do not expect it to happen every other year. But what the vulnerable poor fishermen and women require is protection in daily life from the continuous erosion that is taking place. In many villages, the sea has eroded slowly but steadily washing off huts and shanties of the poor. The erosion could be prevented by immediate measures of placing large stones into the sea-front. It has been noted that those few villages, and the town of Pondicherry were saved because of these measures. But most of the coastal area – specially the vulnerable low lying ones – lack any such protection. The tragedy that has happened should serve as a warning to the states to give priority to save the lives of the poor than to protect the wealth of the rich. If only the states show up one tenth of the care they take for the security of the privileged, things would be different.

There is a correlation between the condition in ordinary circumstances and in situations of emergency and crisis. Experience has repeatedly proved that wherever there has been better conditions in terms of infrastructure, it has been less difficult to handle extraordinary situation of crisis and emergency. That applies to the tsunami disaster as well. A state that does not provide the people in normal life the necessary infrastructure facilities will not be in a position to protect them in times of crisis. The tsunami trial has made it clear how poor the infrastructure conditions are. In several places, the civil administration and state machinery were conspicuously absent in the most crucial two days following the disaster. The survivors felt let down by the state in the time of their worst crisis, because it was not prepared to handle the situation.

The Phases of Relief and Rehabilitation

A doctor was heard saying how he could tell someone who has lost all her dear ones and her home that she should boil her drinking water.

That is an inkling into the problems and difficulties of relief and rehabilitation work in the aftermath of tsunami. The response to the tsunami began with a swing into action to save lives, though more lives could have been saved if the state and its machinery have been alert. It involved also a tentative survey of the extent of damage caused in each country, region and village. Close on the heels came the response in terms of providing protection and shelter to those who were uprooted, and supplying clothes, primary medical care, etc. There is the most difficult and challenging phase yet to come which calls for greater endurance. It is the matter of rehabilitating the affected victims and making them stand on their own legs by providing the means for employment. We could only wish that the initial heroic responses will continue, and see through that the victims are really settled with a home of their own and with the possibility of livelihood for the future. This work of rehabilitation is of a longer duration. To adopt a Biblical phrase, "blessed are those who endure" in this challenging task of accompanying the victims in their resettlement.

We should be careful not to make the relief and rehabilitation as the work of outside forces and agencies. Most important for a lasting solution is the participation of the community. This is required at all levels. That makes the rehabilitation work even more challenging. Experiences in different parts of tsunami hit areas are telling us that rehabilitation is a community project and cannot be executed by any organization or agency, however much they may be in possession of material resources. Most important is the enlisting of the community cooperation. Not in few localities the work of voluntary agencies is causing a lot of confusion in the relief and rehabilitation work, for failing to enlist the active participation of the local people. .

Lopsided Priorities

We cannot fail to note how at the global level billions of dollars are invested in researches and technological applications that benefit those who could have the money and the means. One may argue that in the course of time these technological and scientific researches will percolate and benefit the poor. This prospect need not be contested. But the failure is that of an approach that starts from above and not from below. Science and technology need to be closer to the public, and especially the poor. I mean to say, that technology should concentrate on the life and safety

of the poor here and now, whether it be protection from the ravages of nature, or areas of health that affect the poor most. Tsunami is a powerful reminder to set our priorities right. This applies to the scientific community as well as to the states, policy makers and planners.

Those means and measures that involve the people themselves for their security have the prospect of greater success. A very telling example is what has come about in Bangladesh. Ravaged by the fury of the cyclones and floods year after year, Bangladesh learnt to create a community-system of self-protection. With the help of the local people about 2000 cyclone shelters have been built which protect the people of the low-lying and vulnerable coastal areas. Bangladesh has also created an army of volunteers numbering over three thousand who are trained for disaster management, and they are perpetually vigilant, discussing periodically among themselves, and they are equipped with such simple and effective means of communication as local radios and megaphones to alert the people of the impending natural disaster.

The tardiness of the state to which I referred could be explained in the light of the lopsided global political and economic developments. Since 1989, we are in a period of unbridled capitalism and neoliberalism in Asia. The period of healthy mixed economy is gone. The ideal of welfare state that was projected as an important institution to hold in check the ruthless and exploitative prowess of late capitalism has vanished into thin air. The result is the abandonment of the poor by the state whose heart is with the rich and which does not fail to dole out favours to the corporations. The situation in this respect is identical, whether it is Indonesia, Sri Lanka, Thailand or India.

The Imported "Saviours"

There is a myth handed down and now sanctimoniously routinized in which the developed countries of the West are the saviours from any disaster befalling poor countries. The tsunami presented the large screen to project such an image in an unprecedented manner. There is no need to teach the media on how to blow up things. I can imagine how the western media might show the rushing of the western chivalrous knights with goods and money to save the weak in the affected regions. These images need to be confronted with actual facts and reality. What is concealed in the image of a saviour West is the fact that the overwhelming amount of human and material resources are generated

locally, and the most difficult part of saving operations are done by the local people themselves. This is true in great measure of all the affected countries, and especially of India. When India declined foreign help, this was no pretension. The country has so much of human and material resources that it could manage such calamities by itself. The same attitude was taken also by Thailand. This may hurt many westerners who would like to see India and other countries carry begging bowls appealing to the West, to its largesse and its moral sentiments. They may feel as having been deprived of the opportunity of playing the good Samaritan.

There is no doubt about the deep human compassion and solidarity that move individuals in the western countries to reach out to those in distress, in ways possible to them. We appreciate this humaneness and sense of solidarity. The problem is when states and institutions make a politics out of the help they give, and mislead their people with distorted picture of the extent of this help. It may be interesting to note that the 100 crore rupees (approximately 20 million U.S. dollars) donated by Mata Amirtandamayi, a woman from the Indian state of Kerala, donated for the tsunami victims of the country is a little more than the 15 million the president of the richest nation of the world, George W. Bush promised initially for all the tsunami victims of Asia! What the New York Times noted about the image of an average American has about the aid his or her country gives could be very similar in other western nations. "According to a poll more Americans believe that United States spends 24 percent of its budget as aid to poor countries; it actually spends well under a quarter of 1 percent"⁵. Eric Schwartz, former National Security Council's senior director for multilateral and humanitarian affairs in the Clinton administration, observes that, "even with the president's proposal in 2002 to increase substantially the U.S. commitment to development assistance, the United States was still spending less than 0.2 percent of its gross national income on development aid in 2003, putting us at the bottom of the 20 or so industrialized countries"⁶.

Probably very little is talked in the West about the bulk of the resources, financial and otherwise raised locally, and this is true in varying degrees of all the countries affected by tsunami. The other aspect of the whole relief work is that most of the help both local and

5 *The New York Times*, 30 December, 2004.

6 *The Seattle Times*, 9 January, 2005

from abroad may cease once the shock of the tragedy is over.. The victims will be forgotten at a juncture when more substantial and lasting assistance would be needed – in rebuilding their homes, in acquiring the tools for their fishing, or creating opportunities for employment. This part of the response is not an easy one. Probably few will be left in the field to support the victims. Could a change come about in this ? We could only hope so.

“Good Samaritans” Meet in Jakarta

Imperialism is clever, and it knows to instantaneously don the Samaritan’s robe. We only hope that the much trumpeted Jakarta Summit which brought some of the imperial powers as donors of aid does not turn out to be yet another exercise in hypocrisy with perfunctory and predictable expressions of sorrow and solidarity. The proof of the pudding is in the eating. If it does not become a mere summit of promises, the aid proclaimed should actually be given and indeed without delay. A stitch in time saves nine. The aid that comes forth just now can save many lives. The fear is that, as in the past, only a fraction of the promised aid actually will be given. Moreover, there is also fear that the aid already promised for some other emergency be transferred to tsunami victims. This is not an unfounded fear, and it came forth from the mouth of the secretary general of the UN, Koffi Annan himself, when he cautioned the donors that one should not “rob Peter to pay Paul”.

The callous indifference and apathy manifested in the first days of the disaster by some of the imperial powers, so evident in the derisory pittance they promised in aid, was somehow made good by the Jakarta summit – at least they may believe so. Certainly the display of solidarity in Jakarta was an opportunity for these powers to affirm certain control over the countries at the rim of Indian ocean. We would wish that the imperial leaders who expressed so much shock over the destruction by the tsunami waves by flying over the affected areas would do well to do the same exercise in Iraq and see the devastation effected, and the innocent people killed, the homes shattered and lives crushed, for which they have, not the tsunami but themselves and their war-mongering and predatory economic interests to blame. When there is no real contrition for the devastation in Iraq and Afghanistan, the apparent solidarity by the ruling powers could be interpreted as no more than a show on the world-theatre. I am reminded of a proverb in my mother-

tongue, Tamil, which says that the “wolf was shedding tears because the lamb was getting wet in the rain!”.

Tsunami and Third World Tourism

There were large number of western tourists who were killed in the different countries affected by tsunami, especially in Phuket in Thailand. While we mourn the loss of their lives, tsunami is also a warning regarding the present state of tourism, especially as it is being promoted in the developing countries. For past several years I have been associated with the Ecumenical Coalition on Third World Tourism in which already two decades ago we took up critical involvement and reflection regarding the exploitation rampant in this kind of tourism, specially involving women and children, not to speak of other aspects of this entertainment industry.

Unfortunately, caught up in the current system of economics, countries like Thailand, Sri Lanka and Indonesia viewed tourism as a means to boost up their economy unmindful of the social, cultural consequences and the violation of human rights it involves. Tourism is volatile, and to rely on it by any developing country would be unwise. If tourism is good for Switzerland or Austria, it does not apply in the same way for the developing countries of Thailand and Sri Lanka. The search for tropical paradises by the tourists from affluent western countries cost the people of the land their dignity, their rights, their culture, and their environment. Governments of these lands have been conniving with an industry from which the local middle-men and foreign agencies benefit, leaving some crumbs to the poor.

The tsunami should serve as a salutary warning. The poverty of the local people and their despondency lead them to view tourists from affluent countries as demi-gods and goddesses, and this could be a very demeaning experience for the local people. It is not out of place to speak of *victims of tourist industry*. The servicing of tourists in the best possible manner means for the local people deprivation of such important resources as water, energy, food, all the more so since the tourists coming to Asia continue the same consumer style of life as in their countries, overstretching their demands on the meagre available resources of the local people. Has not tourism assumed a predatory character?

Tourism cannot go on in the present fashion. It calls for a radical rethinking. It may be surprising for many to know that tourism is *the biggest industry in the world today*. Now that tourism has cost so many lives, it is the time to unmask the myths propagated both by national and international tourist industrial agencies. Tsunami is an occasion for us to think seriously about the effects of this tourist industry on the poor host countries of Asia. Issues like sex tourism, abuse of children connected with tourism must be taken up now.⁷ In Asia we need to seize this opportunity to expose these things that are concealed beneath the glamour and advertisement of the tourism industry which entice the western men and women to our parts of Asia. But what are the real prospects? Is tsunami going to stop the rush of tourists to Asian countries? Or, perhaps, tsunami is only a temporary break, to go back again to the same old tourist practices?

Conclusion - The Silver-Linings

After the initial surge of sympathy and solidarity, the survivors and the victims are in danger of being wiped out from the public memory. There will be many trivialities with which media will need to occupy itself for its own survival. It will talk about cricket, baseball and the sport stars, and about Hollywood and bollywood celebrities. In hindsight tsunami will appear to them as only an intermezzo in their cosy way of life. The apprehension that the tsunami victims will be forgotten is then real, both at the national and at global level.

The aftermath of the tsunami tragedy has also revealed the change that has taken place in the past few years. Here we have some silver linings that augur well for the future. The relief workers and others in the field cannot but be struck in several places by the sense of dignity in the victims, which they have not lost in spite of everything. Yes, even when they lost everything, the one thing that remained unscathed is their self-respect. In fact, in most cases these were people who lived through their hard labour as fishermen and as industrious fisherwomen, or diligent workers in other professions. Their hard work was a source of their respect and dignity. The relief and rehabilitation work cannot

7 Felix Wilfred, "Third World Tourism: A Pressing Theological Concern", in T.K. John (ed), *Bread and Breath* (in honour of Samuel Rayan) Gujarat Sahitya Prakash, Anand, 1990, pp. 237- 254. .

simply ignore this fact. A clear sign of their self-respect was the refusal by the victims in several places to accept the used clothes thrown at them. "The crucified people", about whom Jon Sobrino never ceases to remind us about, have not lost their dignity and self-respect, and they need to be treated not with used clothes but new ones. The bleeding-heart of Indian middle and upper class can certainly afford it. Further, the rehabilitation work has to mainly depend upon local resources and more importantly it should be done in such a way that the local community is the chief agent of its own reconstruction. The people need to be active participant in decision making regarding their future. This will correspond to their sense of self-respect.

This calamity of apocalyptic proportions that has visited our Asian countries has shown also the triumph of the human spirit. Human suffering has been either a moment of confirming and reasserting one's faith, or a moment of questioning God; a time of either shattered hope or strengthening of hope through the testing fire, or shall we say, through the testing waters. The tsunami perhaps was an event in which probably there were more people asking critical questions in their minds regarding a God who permits the innocent ones to suffer. In fact, a large number of those who perished are children. Victims who have been so brutally struck and deprived of everything could not be exhorted to resignation. If God appeared to be silent in the disaster, many are beginning to realize her speaking in the outpouring of love and solidarity with the survivors in an unprecedented way. The stories of dedication and passionate engagement of people who work for the victims is the fresh revelation of a God who seemed to be away and absent at the moment of the tsunami strike. Similarly, God seems to break her silence in the spirit of resilience we find in many victims in spite of the most tragic things that have visited them.⁸

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8 Felix Wilfred, *The Sling of Utopia. The Struggles for a Different Society*, ISPCK, Delhi, 2005.

Women in Biotechnology Ethics and Gender Issues

Radha Ramachandran

The author is professor at the Centre of Biotechnology, Anna University, Chennai. In this contribution she presents three different approaches to ethics, and leads us to consider the implications of biotechnology at different levels. A central argument in the article is the need to involve women's experiences, perspectives in biotechnology at different levels – policy decisions, drugs production, fertility or infertility, embryo-research, surrogacy and so on. Conscious of the growing complexity in the field of ethics, the author reminds us that in bio-ethical issues, it is important to ask the right kind of questions. In this connection she observes, "[P]erhaps the wrong question in bio-ethics is to persistently ask for a universally acceptable answer. ... This would indeed be seeking shadows in the dark because even if it were there you would not be able to see it".

"There was a door to which I found no key
There was a veil past which I could not see".

The Ruba'iyat of Omar Khayyam

Ethics can be described as the science of conduct, a phrase used by Henry Sidgwick (1838-1900). The word ethics is derived from the word 'ethos', which means fundamental values, mores or spirit. It is the philosophical study of the moral value of human conduct and the rules and principles that govern it. Ethics is distinct from moral values but that does not mean anything ethical is amoral. What we must bear in mind is that moral rules are essentially laid-down sets of rules or principles of right conduct. However the subject of ethics is clouded by subjectivism, relativity, obtuseness; it is descriptive rather than prescriptive.

A well drafted and comprehensive definition of ethics is given in the Fontana Dictionary of Modern Thought (Fontana 1977). "The branch of philosophy that investigates morality and, in particular varieties of thinking by which human conduct is guided and may be appraised. It is concerned with the meaning and justification of utterances about the rightness and wrongness of actions, the virtues and vices of the motives that prompt them, the praiseworthiness or blameworthiness of the agents who perform them, and the goodness or badness of the consequences to which they give rise".

Three Approaches

Bio-ethics is the study of ethical issues in medicine and biotechnology. In the last decade or so ethics and more so bio-ethics has become a catch phrase. Every profession wants its own ethical rulebook. With the kind of influence that biotechnology is now wielding, it is now capable of radically affecting the lives of human beings and the world we live in. There has never been a more dire need for looking at bio-ethics. Behaving ethically means that whenever we are confronted by an ethical dilemma we shall always seek to justify our actions based on three ways of morally examining our actions. These are: goal-based approach; duty-based approach; right-based approach.

Goal-based approach: This means that we consider our actions based on the consequences it will have. What are the motives for my action? Whom will it help? Whom or how many will it hurt, even though it is difficult to find happiness that is commensurable and which most people would experience as happiness. Ultimately, what is critical is that our decisions should bring the greatest good to the greatest number.

Duty-based approach: This suggests that in our search for ethically right decisions we ought to uphold moral values which are inherently important, such as autonomy, justice, fidelity and non-maleficence.

Right-based approach: By this we imply that our actions do not infringe upon the rights of others. We should consider our action based on the effect it will have upon the happiness of those involved. If they are happy for the action to take place then the action is ethically justified.

Ethical Implications of Biotechnology at Different Levels

Given this backdrop on ethical principles, this article would briefly address the issues of ethics and women's issues in biotechnology. Why

are we talking of women's issues? Because of the values that women bring to any discussion. Women bring a vital perspective to all issues that affect society and it is critical for that perspective to be included in all bio-ethical related public policy and debate. Our goals need to be to promote thoughtful application of biotechnology to improve the status of women's lives, seek to protect vulnerable populations by anticipating unintended consequences, safeguarding women's bodies from harm and ensuring that women's life priorities are recognized.

We need to care about bio-ethical issues because the rapid pace of biotechnology is quickly outpacing our ability as a society to absorb how our lives will be affected by it, from conception to death. We are already grappling with grave and serious issues such as cloning, stem cell research, IVF and prenatal identification of genetic disorders, just to name a few.

Advances made in biotechnology will profoundly affect what it means to be human and how we live our lives. It will affect us on numerous fronts, politics (public policy, legislation, control of resources) spirituality (what is life? what does it mean to be human?), culture (what does it mean to be a mother if children are born outside the womb?). We need to address our moral rights and consequences.

The recent advances in the last decade have now enabled scientists to decode the entire genome. Consequently, one is able to predict the gender of a foetus which has led to female infanticide or abortion of the female foetus grossly distorting the sex ratio in many countries. Even more, biotechnology has allowed us to screen for diseases that have not manifested yet; it has allowed for screening for genes that are specific to certain races and thus leading to societal discrimination. What implication do our genetic make up reveal? How do the new technological abilities differently affect gender, class and race? All this information create a new class in society, those of the genetic have-nots.

Women's Perspectives and Experiences in Bio-ethics

You may wonder why do we need a 'women's perspective' in bio-ethics and of gender issues? It is because women's voices, perspectives, and experiences are not adequately represented in the current bio-ethical debates, public policy decisions or in academic research. The majority of those leading the public debate are men. Women can neither rely on, nor expect men to represent the entire range of human experience and

perspectives. There are no organisations devoted to document the women's perspectives. History talks too little about women. Historically, women have entered late in the political game, and have to spend time and resources undoing legislation and policies that did not take into account the considerations and life priorities of women. In bio-ethics we still have the chance to get ahead of the curve. If we act quickly we can anticipate rather than react to problems, and ultimately influence the course of history for the good of the entire society. The time to effect these issues is now.

It is important for women's experiences to be included because 'gender neutral' does not work if the society is not gender neutral. Men and women are different. Our gendered roles, our physical bodies and even the roles we play in society lead us to different experiences, which are different from men. The experience produces different needs, expectations and concerns. For example, due to their bodily experience and role as primary care givers, women have a fundamentally different stake in most reproductive issues than men do. We cannot talk about bio-ethics and women without addressing reproductive issues. Pro-choice vs pro-life debate,

Reproductive freedom? There are many controversial topics in this area, which involve abortion, which I will not touch upon. However, the use of contraceptives has over the last fifty years or so raked up several ethical issues. End users, the women were not involved in the design of or innovation of suitable technologies. The pill was introduced in the 1960's as an oral contraceptive, this was an estrogen/progesterone preparation. However, in many countries where abortion was not legal or not safely available women started using these drugs post-coitally in a much higher dosage, as an emergency method of fertility regulation. The safety and efficacy of this method was tested extensively and this method of hormonal contraceptives was encouraged. The World Health Organization decided to include this use, named the Yuzpe regimen in its list of Essential Drugs in 1995. What I am trying to say is that we should listen to the experiences and the needs of women. Users can play a role not only after a product is available but from its design onwards.

Antifertility Vaccines and the Role of Real Users

Norplant is a long acting hormonal implant. Six small hormone-

releasing rods have to be inserted and removed by a health care worker under the skin of a woman's upper arm. Problems in implantation in Egypt and Bangladesh arose where health care workers refused to withdraw the implant upon request, because the expertise was lacking, or because allegedly it was such an expensive method. Health problems were signaled in Brazil and Indonesia because the implant was removed after 3 or 5 years and no registration had taken place. This led to abusive situations.

Who decides the fate of a frozen embryo if the parents can't agree? With the kind of inroads we have made in reproductive technologies and assisted reproductive medicine, there are newer problems than we ever dreamt of.

While technology has enabled infertile couples to conceive, the problems of frozen embryos supposedly generated to be used in the future has become a serious issue. Who owns them, if they are no longer claimed? Can they be experimented upon? Can they be traded like a commodity? What if the father doesn't want it; if the mother wants it implanted in another womb? Now the court decides. But what we need is a public debate. Women who are infertile can now choose to have their embryo implanted in the uterus of another woman. Is this a womb for rent, or surrogate motherhood? Is it reproductive freedom or economical exploitation? What about gender justice and global health? Who is harmed when women are excluded from disease studies and clinical trials of new drugs? Everyone! Shockingly women have been excluded from heart diseases studies until recently. Because of that we didn't know when women were having heart attacks, because their symptoms and risk factors were different from those of men. Doctors did not have the information to treat their patients. Countless women did not receive the life-saving care they needed and were left untreated, and many died. Families suffered the loss of a mother, sister or daughter.

The gynaecological health of HIV positive women was also not studied until recently. AIDS also presents differently. Women have PID, cervical cancer or abdominal pain, men have sarcoma. So women have not received the same level of care as men; women have not had access to early diagnosis which could have made them eligible for life saving drugs and other support services

You will find more problems in ethics than solutions, more questions than answers. It is much more important to concentrate on the questions. It is only when you have clarified and asked the right questions that you can hope for a right answer. The wrong question will invariably produce the wrong answer.

Perhaps the wrong question in bio-ethics is to persistently ask for a universally acceptable answer. A searching for absolute value judgements. This would indeed be seeking shadows in the dark because even if it were there you would not be able to see it. An absolute value judgement is a contradiction in terms. Of course, there is the importance of consensus. This consensus can influence legislation. It can form opinions and persuade by pressure, thus improving both conduct and behaviour.

Susan Wolf of the University of Pennsylvania said, 'Practically every issue in biotechnology has implications for women', but that doesn't mean there is one women's voice.

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Motherhood-Biotechnology and Its Ethical Implications

Mathew Chandrankunnel

In this article Dr Mathew Chanrakunnel, a scientist from Dharmaram College, describes in detail some of the biotechnological processes connected with motherhood, as well issues like stem-cell research, cloning, etc. In presenting the technical aspects of biotechnology, he discusses such important questions as surrogacy in motherhood, and the morality of biotechnology connected with embryo research and experiments. The author concludes underlining the sacredness of life and the respect and dignity that should be manifest in any technological experiment and research, transcending commercial consideration and comodification of human life.

When science was born in the 16th century, its intention was to study nature, understand its dynamics and manipulate it for human benefit. Its methodology of observation, experiment, hypothesis formation, verification/falsification, law statement, technological adaptation has paid high dividends, and thanks to it, humanity is enjoying unimaginable comforts. Today, science has turned its search light into the structure of human life itself, discovering the language of life (DNA) and manipulating it. Science in its manifestation as biotechnology discovered tailoring genes, creating clones by fusing ovum and cell from any part of the body at any age, developing organs from these clones, transplanting embryos, treating genetically and creating off springs to cure the diseases of their blood brothers. At the beginning of the twentieth century, science has given great hope in alleviating the miseries of humanity. But science also threatens humanity with its newly developed technologies, especially biotechnology. This frontier science has both great potentials as well as perils.

Biotechnology engineers and manipulates life. Life in its initial stage is the fusion of the ovum and the sperm to form a single cell. Ovum is the symbol of life and motherhood. In biotechnology, ovum forms the basis of all manipulation. In cloning, in surrogate motherhood, stem cell research, everywhere the ovum is manipulated genetically. Even without the sperm, new life can be created by fusing the ovum with the nucleus of another cell. Therefore, motherhood is at stake, and hence the title of the article, "Motherhood-Biotechnology and Its Implications". Women become the basis of this new technology to a certain extent; their eggs are manipulated for good or bad. The epoch making ethical, religious and social dimensions of this technology is presented here in this article.

In the first place I present the glimpses of miracles created by Biotechnology and then describe the manipulation of surrogate motherhood, stem cell research and cloning. The moral implications are dealt with basing on certain ethical questions that arise as a result of the basic notion of the sacredness of human life.

Glimpses of the Benefits of Bio-technology¹

"We have glimpsed at a silver lining over the horizon," said Song Chang-Hoon, a member of the research team and a professor at Chosun University's medical school in the southwestern city of Kwangju. "We were all surprised at the fast improvements in the patient." Under TV lights and flashing cameras, Hwang stood up from her wheelchair and shuffled forward and back a few paces with the help of the frame at the press conference here on Thursday. "This is already a miracle for me," she said. "I never dreamed of getting to my feet again." Medical research has shown stem cells can develop into replacement cells for damaged organs or body parts. Unlocking that potential could see cures for diseases that are at present incurable, or even see the body generate new organs to replace damaged or failing ones.

This is the breathtaking story of a South Korean woman paralyzed for 20 years and is walking again after scientists say they repaired her damaged spine using stem cells derived from umbilical cord blood. Hwang Mi-Soon, 37, had been bedridden since damaging her back in an accident two decades ago. Her eyes glistened with tears as she walked again

1 These instances of medical miracles related to the Biotechnological discoveries were gathered from the internet.

with the help of a walking frame at a press conference where South Korean researchers went public for the first time with the results of their stem-cell therapy. They said it was the world's first published case in which a patient with spinal cord injuries had been successfully treated with stem cells from umbilical cord blood. Though they cautioned that more research was needed and verification from international experts was required, the South Korean researchers said Hwang's case could signal a leap forward in the treatment of spinal cord injuries. We have to read these revolutionary steps of Hwang in the background of Christopher Reeves, the superman who met with a polo accident and paralysed and died recently. Stem cell research kindles the hope for such millions of people.

* * *

This is the first time in history "saviour siblings" – children conceived to be saviours of their elder ones - are created to treat children. Couples conceived a child to have a natural tissue match for a sick sibling. This method can also lead to terminations where the foetus is not a tissue match for the sibling. "It's a big step, because it gives people another option," says Mohammed Taranissi, at the Assisted Reproduction and Gynaecology Centre, London, UK, one of the team-members. "Before that the only option was to look in the siblings and immediate family to see if you had a match or alternatively to just keep trying [to have a baby which matches]." The chance in that technique was only five percent and now in this new technique there is 98 % success. The aim in these cases was to provide stem cells for transplantation to children who are suffering from leukaemia and a rare condition called Diamond-Blackfan anaemia (DBA), serious non-heritable conditions.

* * *

Bad news, says your doctor; "Your liver is failing". So he extracts stem cells from your bone marrow and injects them into a sheep foetus while it is still in the womb. When the sheep is born, much of the animal's liver will consist of your own cells - ready to be harvested and given back to you.

This dream therapy is still years off, if it happens at all, but the first steps have already been taken by a team led by Esmail Zanjani at the University of Nevada, Reno. "Esmail has some pretty startling results,"

says Alan Flake of the Children's Hospital of Philadelphia. Zanjani's team hopes the animal-human chimeras they are creating will one day yield new cells genetically identical to a patient's own for repairing damaged organs, and perhaps larger pieces for transplantation. It might even be possible to transfer whole organs, since in some cases having at least a partly human organ would be better than a purely animal xenotransplant. Immune rejection of the animal portion would still be a problem, but it is not insurmountable, says Flake. "I don't think that in 10 to 15 years that's out of the question." If perfected, the technique could overcome some of the big stumbling blocks facing researchers who want to make tissues and organs for implants. It might yield significant quantities of just about any kind of cell or tissue, for instance, with no need to fiddle about with different culture conditions or growth factors. Instead, the host animal's own developmental program guides the injected human stem cells into their final roles. "We take advantage of the growing nature of the fetus," Zanjani says. It would also allow doctors to obtain immune-compatible cells without having to create human embryos by therapeutic cloning. Human cells could be separated from the animal ones simply by modifying existing cell-sorting machines. Providing the method really does produce normal human cells, they would not be rejected. And any stray animal cells would be killed off by the recipient's immune system.

* * *

Surrogate Motherhood

Surrogate motherhood is not something new! There is an interesting scenario described in one of the oldest scriptures of humanity, namely Bible. The case is that of Sarah, the barren wife of Abraham. Sarah could not have children till her old age. She was sure of her barrenness and accepted her own incapacity. She decided to transcend this inability by giving her handmaid, Hagar, to her husband Abraham to produce them a child. (Genesis 16: 1-4). Surrogate mothers are hence sought after and at present biotechnology has come of age to give them not a new solution to the old problem of not being able to reproduce an offspring. According to statistics, ten to fifteen percent of married couples are unable to have children.

In most cases, surrogate motherhood is undertaken because the man who desires to be a biological father is married to a woman who is

infertile. They may have considered adoption, but often are discouraged by the shortage of healthy infants, or by regulations (such as age or income) that may reduce or eliminate their chances of adopting. Surrogate motherhood allows them access to the child within days of its birth, and creates a biological connection between the father and the child. Sometimes single men have also sought surrogates because they cannot find, or do not want a marital partner, but do desire biological parenthood and the chance to raise their own child. Also impotent men would like to have a child from his wife's ovum fertilized with the sperm of a donor.

Another element that may vary in the surrogate arrangement is the relationship between the surrogate and the childless couple. The surrogate may be a friend or relative who volunteers to conceive and bear a child out of personal concern for the couple's situation. Other surrogates, though, are women who respond to advertisements, agreeing to be matched with couples previously unknown to them. They may be motivated by compassion, curiosity, or the desire to experience pregnancy and childbirth without responsibility for the child. Sometimes, in the latter situation the surrogate and the couple become friends during the pregnancy; other times they remain anonymous. Whether previously acquainted or not, the relationship between the surrogate, the child, and the couple may take one of several shapes after the child's birth and surrender. The surrogate may remain in close touch with the couple and her child, and the child may or may not be informed that the surrogate is his biological mother. Or, all ties may be severed at birth and, again, the child may be informed that a surrogate mother gave him.

Types and Nature of Surrogacy

A surrogate mother is a woman who carries the embryo of an infertile couple. This is the gestational type of surrogacy. The surrogate is only the genetic mother and not the biological mother. The other type of surrogacy is traditional surrogacy; letting not only the womb but also the ovum. The traditional type of surrogacy involves the surrogate mother being artificially inseminated with the sperm of the intended father or from a sperm donor when the sperm count is low. In this case, by donating the ovum, the surrogate mother becomes the biological and genetic mother of the resulting child. In the case of gestational surrogacy, the ovum of the biological mother is fertilized with the sperm of her

husband and implanted either in the uterus or in the fallopian tube of the surrogate mother. In this process, the surrogate mother simply rears the biological child by giving it all the necessary nutrients for the development. In the traditional process, the activities involved are the following:- the harvesting of the ova, collecting the sperm, fertilizing them in the laboratory, keeping the embryos in a cultured medium and implanting them in the womb of the surrogate mother.

Harvesting the ova

The traditional surrogacy involves a two-fold preparation. The uterus of the embryo recipient (surrogate) is treated with hormonal replacement while the ovum donor is stimulated with fertility drugs in order to harvest ova and then fertilize them in the embryology laboratory with the designated sperm. The fertilized embryos are then transferred to the uterus of the surrogate for implantation. Though this process can thus easily and simply be described, it incorporates many sub-processes involving a lot of emotional stress.

First of all the ovum donor will have to be treated with hormones such as gonadotropins (Folistim, Gonal F, Humegon, Pergonal, and Repronex) to stimulate the development of enough follicles to optimize the number of mature eggs available for egg retrieval. In preparation for this treatment, the donor will be asked to use birth control pills (BCP) for eight or more days. Thereupon, she will receive GnRHa (e.g., Lupron) injections in combination with the BCP for about five days, after which the BCP will be discontinued. With the subsequent onset of menstruation approximately seven to 10 days later, the donor is given a blood test and baseline ultrasound examination to exclude the presence of ovarian cysts and to confirm that her ovaries are ready to be stimulated with gonadotropins. The donor's first day of gonadotropin injections is referred to as cycle day (CD) 2. On CD-9, intensive daily monitoring by means of blood hormone measurements and ultrasound examinations will begin. Usually, for harvesting the ova, one to four additional days of gonadotropin treatment will be required. Once monitoring confirms that the donor's ovarian follicles have developed optimally, she will receive an injection of the ovulatory trigger, HCG. The egg retrieval (ER) is performed 34-36 hours after the HCG injection.

Synchronizing the Cycles

For successful surrogacy, it is absolutely necessary that both

women's cycles be synchronized as closely as possible, so that the endometrial lining of the embryo recipient's uterus can be optimally prepared for implantation of the transferred embryos. This is achieved by administering the BCP with Lupron in the same manner as with the donor. By lengthening or shortening the duration of BCP treatment it is relatively easy to synchronize the cycles of the donor and embryo recipient.

Building Uterine Lining

The surrogate receives estrogen treatment in the form of biweekly injections of estradiol valerate. The surrogate's blood is tested one day prior to each scheduled injection to measure estradiol concentrations in order to determine the subsequent dosage. The surrogate also undergoes ultrasound examinations to evaluate the development of her endometrial lining.

Egg Retrieval (ER), Fertilization and Embryo Transfer (ET)

The ovum donor undergoes transvaginal ultrasound-guided ER. The eggs are then fertilized with designated sperm and embryo/blastocyst growth is monitored daily. Meanwhile, the surrogate begins daily injections of Progesterone in preparation for the embryo transfer. Embryo transfer usually takes place three days following ER; blastocyst transfer is conducted five to six days after ER. After the embryo transfer, vaginal progesterone cream/suppositories are added to the hormonal regime to optimize endometrial development. When pregnancy occurs, the surrogate continues the hormonal treatment for an additional 6 to 8 weeks while all medications can be discontinued and the pregnancy resume normally. Thus the gestational surrogacy is a tedious process involving the surrogate and the ova donor injecting both of them with many hormones and synchronizing their menstrual cycles for optimum result. It raises many ethical questions.

In many instances of egg retrieval, more eggs are harvested from the young donor than are required for a single attempt at achieving a pregnancy. This means there are often several supernumary embryos left over for storage (cryopreservation/freezing), to be used with a future attempt at pregnancy. The cryo-preservation of a large number of embryos induces many ethical and religious questions. If the surrogate is married, the consent of her husband is required for the process and they have also been advised to keep abstinence for a successful

surrogacy. These situations and the attitude of the surrogate bring forth ethical and religious challenges. The ethical dilemma is brought out clearly by Pope John Paul II in 1996 by stating that “there seems to be no morally licit solution regarding the human destiny of the thousands of ‘frozen’ embryos which are and remain the subjects of essential rights and should therefore be protected by law as human persons.” Almost in the same vein, Chris Smith, the Republican representative in the American Congress from New Jersey alarmed that, “We need to look at these cryogenic tanks as frozen orphanages rather than some kind of material that scientists can manipulate for whatever reason they would like to.”

Cryo-preservation of Sperm

In the gestational surrogacy, a cryo-preserved sperm is used. This process involves gathering the sperm and placing it in liquid nitrogen and storing in an insemination facility. The sperm can remain cryopreserved for over 16 years. Cryopreservation process includes, collecting the sperm (masturbation), chemical removal of water which prevents the formation of ice crystals, a cryopreservant buffer is added for support and protection (glycerol) of the sperm and actual freezing the sperm in liquid nitrogen in plastic straws, glass ampules, or cryovials. These vials are stored in sperm banks or Infertility Clinics, and can be transported worldwide. Again, on moral principles, certain religious groups object the process of sperm gathering.

Ethical and Religious Questions

Against the above described lengthy bio-technological process of surrogate motherhood, stem cell research, therapeutic cloning, etc.. we need to ponder over the serious ethical issues. These issues can be boiled down to a few ethical and religious questions. Most of these issues are centered on motherhood and woman. The donor of the egg is a woman, the recipient of the embryo is a woman and it is gestated in the womb of a woman, the hazardous chemical treatment for the preparation of ova harvesting and embryonic transplantation is undergone by the women .

Is it ethical to harvest more ova?

What are the pros and cons of using unused embryos for medical research?

Is there anything wrong with disposal of unused embryos ...leaving them in the bank to degenerate?

Is there anything wrong with a surrogate giving her unused embryos to someone else?

Who should make a decision to thaw frozen embryos?

What if the surrogate decides to maintain her privacy?

What if the surrogate and the spouse violate the abstention clause?

What if the surrogate decides to keep the baby?

What if the surrogate with genetic ties demands to visit her child?

Do women participate in surrogacy to save their marriage?

Is it wrong for a surrogate to abort?

Is handing over a child after delivery for a fee, "baby-selling"?

What is the mental attitude of the surrogate – altruistic or monetary benefit?

If monetary benefits lead to the surrogacy, would it not affect the personality of the child?

If the child born is mentally and physically challenged, who would take care of the child?

If the biological parents denies the care of such a child, who would take care of it?

These questions show the depth of ethical implications of the surrogate motherhood. It may be argued that the surrogate is empathetically driven by an altruistic motive to share what she has, and relieve some of the social stigma of another person, not being able to produce a child, rather than motivated by economical considerations. In addition to the above questions, the psychological aspects associated with being a surrogate mother are: artificial insemination (over several months), pain, unpleasant side effects, depression, sleep disturbance, guilt conscience, difficulty in remaining unattached, etc.

Surrogacy asks some fundamental questions, namely what does it mean to be a parent? How should we consider children - as a gift or as a commodity? Does every one have a right to have children by any means? Obviously, money frequently changes hands in an adoption just as in surrogacy. If the money is paying for a child, rather than for a service, then is the child's giftedness being violated; and is the child himself or herself being reduced to a commodity, one good alongside other goods we buy and sell in our economy? And if the answer to this

is 'yes,' then (at least) paid surrogacy violates the dignity of the personhood of our offspring, for only THINGS have prices; people are too valuable to be for sale.

In surrogate motherhood, there are three types of mothers, the genetic mother (provides the egg and ½ of the genetic code 23 chromosomes), the gestational mother (she carries the foetus inside her body), and the social mother (contributor to the raising and care of the child). Each is important for the well-being and development of the child. Surrogacy is not a simple arrangement; it is extremely complex. The relationships can be stressful, overwhelming, and intense.

The inextricable bond between the gestational mother and the child is not well taken care in surrogacy. Because of her mental and emotional links with the child, if a surrogate mother decides to hold on to the child, it will definitely implicate a legal battle. After the birth of the child, the surrogate is not to foster a relationship with the child, so that the child will only know its nurturing parents and shall not be confused. The problem with this argument is that a mother naturally bonds to her child during pregnancy, and that giving him or her up is often hard to do. If a surrogate does fight back, as only a mother would, she is seen as evil and cannot tell the truth.

The social parents or the biological parents are placed in a difficult position to inform the child about his or her birth. The amount of technological knowledge as well as the confusing (even for an adult) idea of multiple parents far surpasses these two cases. Perhaps, more difficult to explain to a child (and even unfair to hold against him or her) is the fact that his nurturing parents paid for the ability to raise him. Another problem to think about is the case of the parents who are unable to conceive because of their age, and so go about gaining a child through surrogacy. The child then must spend much of its life dealing with his incapacity to cope with the aged parents or single parent, resulting in the stunting of his or her natural growth.

Commercialism and consumerism

In today's consumerist society, more and more items and services are being treated as commodities, and are being bought and sold. Children have also thus been demoted to the status of a commodity. Though biotechnology offers the technical assistance of having a designed baby with the characteristics and talents one is looking for, it dehumanizes

the entire reproductive process and lowers it to the status of a consumerist mall where you can purchase any product if you have the means. A couple wishing to have a child (if the wife does not want to carry the child for nine months, or an infertile couple or single parents) can walk into a fertility clinic, chose a surrogate mother, buy the child she produces from her (and pay the clinic/agency for overseeing the deal), and leave with a contract stipulating that the child is theirs legally. Here motherhood is lowered to the status of a factory productionline devoid of the sacrifice and love bringing forth a child involves.

The Surrogate Mindfulness

Surrogates agree for a number of reasons: curiosity; to assuage guilt over an abortion; because pregnancy and birth had been or were anticipated to be rewarding experiences; or, most commonly, out of compassion. By themselves, these are not appropriate reasons for undertaking procreation. There is no context of loving commitment to the child's father — a basic prerequisite. Besides, unlike the husband in the infertile marriage, there is no intention on the part of the surrogate even to care for the child she deliberately conceives. The absence of these elements reduces human procreation to the mere biological production of babies, and so degrades one of the most wondrous of human capacities. Some women, in defending the decision to become surrogates, describe themselves as "providing the gift of life" — an action which appears commendable. However, children are not to be viewed as entities to be created in order to be bestowed on others, as though they were handmade sweaters or cookies. Participation in their creation entails a responsibility for their well-being and the surrogate has no intention of carrying out that responsibility beyond birth. There are certainly other contexts in which one or both biological parents may surrender their role to others, but these are not normative situations. Moreover, the premeditated character of the surrogate's decision to forfeit a parental relationship makes her choice especially repugnant.

Embryo – A Person?

Who am I? It is one of life's basic perennial question that has troubled philosophers through out the centuries from the very beginning of human thought. One aspect of the answer lies in working out what it is to be a person. This is not just of academic interest alone because the conclusion will affect the way we think about key issues relating to human life and

biotechnology. The beginning of human life is the fusion of the ovum and the sperm –fertilization- that gives an embryo. The consideration whether it is a human person or not has become a hot ethical issue. The fertilized embryos that fail to implant, (natural abortion) are estimated to be between 25% and 75%, making it difficult to believe that all these are lost people. In addition to that, there are scientists who point out that fertilisation is a process that occurs over at least 24 hours, so there is no defining ‘moment of fertilisation’ to look back on.

Implantation, is the process where the embryo buries into the lining of the mother’s womb, and the embryo releases human chorionic gonadotrophin, which wards off a period and prevents itself being washed away. Thus without a successful implantation, which starts at about 5 to 6 days after fertilisation and is completed by about 14 days, its survival chances are nil. From the implantation onwards the relationship between the mother and child begins in a radical way. The embryo cannot live without the nutrients from the mother. Some are of the view that life begins only after implantation, and from that time onwards only an embryo can be considered as a human person. Some others are of the view that in order to be a human person the embryo needs a nervous system. They argue that we accept that brain death is the time when a person’s life ends, so there can be no person until the brain, or at very least some nerves, have started to function. Up to 14 days the embryo has been a simple ball of cells. However, from this point a group of cells distinguishes itself within the ball and forms the primitive streak, the cell mass that will eventually become the full-grown baby. It was for this reason that the Warnock commission (USA) set 14 days as the point beyond which no-one is allowed to perform experiments on human embryos. At around 17 days after the fertilization the neural tube begins to form in the embryo. If you see the nervous system as the key to being human, then this is the point of definition. However, the first nerves are a very long way from forming the complex network that we accept as being a functioning brain.

After seven weeks of development, all organs are basically in place and the embryo looks distinctly a human being. It is now called a foetus. Early thinkers such as Aristotle (383-322 BC) and the Christian theologian and philosopher Thomas Aquinas (1225- 1274) decided that this physical maturity signalled the time when the embryo became ‘ensouled’; became a person. According to Islamic scriptures the embryo is sacred from

day-one, deserving protection. But after about 6 weeks from fertilisation, God breathes in the person's soul. There are other thinkers and scientists who argue that self-awareness (or consciousness), feeling pain or emotion, are the criteria for deciding whether an embryo is a human person or not. In the early stages of life, the embryo does not have the above clear human characteristics in its embellished forms, and hence some thinkers say embryo is not at all a person and positively argue that therapeutic cloning and stem cell research can be done on them.

Thus basing on the definition of life, there are different views on the definition of the essence of being a human person. The scientists differentiate between "pre-embryos" or "pre-implantation embryos" and embryos implanted in the womb, while others like St. Thomas hold a gradualist view. According to many scientists and bio-technologists, the pre-implantation embryos could definitely be manipulated. Thus the embryo's life is divided in its inception as early and late embryos!

There are two views on the nature of human person. At one end of the spectrum is the view that, from conception, the embryo is fully a person with all the rights any person has—most notably the right to life. On the other hand, legal scholars like John Robertson and reductionist scientists take an extreme procreative liberty and claim that the early embryo is little more than cellular material, and can be manipulated to any extent.

Here the basic question that arises is whether an embryo is a human person. However there are differences of opinion from the scientific perspective depending on which definition of person one is holding on to. Scientists are prone to take a lenient view, because of the prospects of research, while the religious thinkers generally hold on to the view that from inception onwards embryo is a human person and it is sacred.

Another important corollary that emerges from the discussion is that whether the reproductive capacity can be used for non-reproductive ends? Is the embryonic life is sacred, or is it insignificant, and is just like any other human cell? The scientists can work out alternative for the embryonic stem cells because as Msgr. Dennis Schnurr, pointed out on behalf of the American bishops that the promising work being done on adult stem cells eliminates the need for embryonic stem cell research. "The existence of such startling new alternatives [as adult stem research], which may be much more amenable to clinical use, and do not require

any destruction of human life,” he wrote, “poses a significant new issue for ethics and public policy”.² If the adult stem cells can be converted into stem cells, then a majority of ethical problems related to stem cell research can be avoided. Biotechnology at present is capable of transforming any human cell into ovum or sperm.

Thus in all the biotechnological researches related with human embryo, namely, surrogacy, therapeutic cloning or cloning, the question is whether the embryo is to be considered as a mere cell or a potential human being?. Many researchers claim that embryo is a mere group of cells and can be engineered for research, while many ethicists and religious leaders claim that embryo is human life itself, and it has to be given respect. Human person is constituted by a human body, and any living human body can constitute a person. Person as the locus of value begins from the very moment of the distinct existence of the human body. Though, the personal qualities of self awareness, intelligence etc., are not so visibly expressed, embryo has the full potential of the manifestation of the human being. So the biotechnological research with human embryo cautions us to deal it with the whole matter with dignity and respect.

Conclusion

Biotechnology today makes it more and more clear that all life on this earth is as inextricably intertwined with other lives, and it is a biological continuum. We discussed, the methodology and the ethical implications of therapeutic cloning, stem cell research and surrogate motherhood. It should be emphasized that in all these researches with life, human dignity is to be upheld and respect to life is to be maintained. All religions expect that the ends as well as the means are to be good. India is an emerging giant in the field of biotechnology and the timeless spiritual dimension of India is to be upheld by the biotechnology researchers of India. India has thus the unique position to blend technology with a spiritual and ethical orientation. Indian spirituality considers all forms of life as sacred.

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Decentralized Food Security Systems

A Case Study from Chhattisgarh

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The author is the Director of Rupantar NGO for Bio-diversity. Her contribution is concerned with viable alternatives in food security. It examines the decentralized and sustainable food security systems that have traditionally existed in the forest areas of Chhattisgarh. It shows how these systems are relevant, and provide workable solutions for today. The author brings out also the important role of women in food security, and concludes with some policy recommendations.

The food economy of rural Chhattisgarh is closely interwoven with forest based collections of uncultivated foods, and in this sense Chhattisgarh is very different from many other parts of India. Women have traditionally played a central role in the maintenance of these systems. The situation in Chhattisgarh in this regard is resonant with the food security systems in many other forest based and/or tribal communities in India and beyond. With the onset of globalization and the growing commercialization of forests, this dynamics of the entire situation stands endangered. It is our purpose to critically examine the system yesterday and today, to understand women's role in sustaining it, and to offer workable suggestions for tomorrow that will incorporate the strength of women.

The Context and the Ecological Zones

The context of the discussion is provided by Chhattisgarh, a state over large parts of which the forest intrudes over many aspects of rural life. Perhaps it is possible to extend the arguments to other areas with a similar developmental history.

The Chhattisgarh region is an area that is an ecologically, linguistically, and culturally distinctive region. Administratively it comprises of 16 districts, carved out of the original seven, viz., Raipur, Durg, Rajnandgaon, Bilaspur, Surguja, Raigarh and Bastar. The last three districts lie on the fringes of the region, and are considerably influenced by the culture and ecology of the areas they border, Mirzapur, Ranchi, Gumla, Gadchiroli, the KBK districts of Orissa, and the Telengana districts of Andhra Pradesh. The Chhattisgarh region has a large area under forest cover, rich mineral reserves (limestone, quartzite, iron ore, bauxite alexandrite), and a large tribal population. The river Mahanadi flows through the central part of the region, and the plain areas in the river valley are famous for rice cultivation, with input intensive HYVs having replaced traditional seeds in much of this region. Along the railway, that passes through the valley centre, there has sprung up over the last twenty years, an industrial belt with the public sector giant Bhilai Steel Plant, three large cement plants, steel rolling and re-rolling mills, and a large mixed industrial estate. This massive industrial endeavour is backed up by a series of dams on the upper Mahanadi and electric power from the National Thermal Power Corporation (NTPC) units at Korba.

The population is mixed around this industrial and urban belt. In the rural areas of the Mahanadi valley, OBCs like the Sahus and the Kurmis dominate agriculture, and the Satnamis constitute a major scheduled caste component. Chhattisgarh has approximately 34% Scheduled Tribe population, 12% Scheduled Caste population, and more than 50% Other Backward Classes. While the process of modernization seems to be apparent in the valley areas, the situation in the forest and hill areas on the periphery of the district is quite different. Although being affected more and more by invasive forest and mineral exploitation, traditional lifestyles and population compositions have survived to a greater extent here. Some of these areas, dominated by the Gond, Halba and Kamar/Bhujia and Oraon tribes, have recently been covered under the Extension of Panchayati Raj to Scheduled Areas (PESA).

Like the neighboring state of Jharkhand, Chhattisgarh is also a resource rich state. It consists of three natural regions that are rich in minerals, forest produce as well as fertile alluvial plains. The first natural formation is a continuation of the plateau of Baghelkhand that joins up with the

Jharkhand plateau along the northern borders of the state. Since the area is next to the Maikal ranges from where the Narmada and the Son originate, it is drained primarily by the Son that divides Chhattisgarh from the rest of Madhya Pradesh, of which the Chhattisgarh basin formed an integral part before it became a separate state. The area is rich in Kosa silk propagation (Champa in Bilaspur being the center of local trade in Kosa), coal, bauxite and limestone which is mined by big companies in the Surguja Area. The area was also rich in forests especially mixed forests of Sal, Mahua, Amla, Sheesham, Semul, Rohini and Palas to name a few. The *Pahadi Korwa, Majhi, Majhwar, Nagesia* and many other such tribal groups who did seasonal gathering and cultivation primarily inhabit the area. Administratively, the area covers the districts of Raigarh, Jashpur, Surguja, and Korea.

The second ecological zone consisted of the Chhattisgarh Plains in Southern Bilaspur, Raipur, Durg, Rajnandgaon and Raigarh. This area, forming the Mahanadi Basin was also known as the "rice bowl" of Central India. It was particularly rich in indigenous varieties of rice and methods of harvesting water. Apart from this, the region also has iron ore, bauxite, limestone, asbestos, and is also known for Kosa silk. The area is mostly inhabited by Gonds, Kamars, and cultivators like the Kurmis, Sahus, Kalars, and Satnamis and others.

The third ecological zone in the region was the Bastar or the Dandkaranya Plateau that began from Kanker and ended in the Dantewara region in the southern most part of Bastar. This area borders with the East Godavari region of Andhra Pradesh and is drained primarily by the Indravti River. Its main natural wealth consists of forests and minerals. The area is known for its rich Sal and mixed forests. Bastar is well known for its minor forest produce like *Imli, Amla, Chironji, Mahua, Harra* etc and also for minerals like mica, manganese, iron ore, bauxite and limestone. This region includes Abhujmarh, the abode of the Maria Gonds and also has a considerable Kamar and Gond population. It was also one of the oldest Gond feudatory states of the regions and because of this, its history has acquired significance for all scholars of Central India.

Although resource rich, Chhattisgarh is home to large numbers of people who are among the poorest in the country, the gains of development and industrialization have gone to migrants and 'skilled'

labour force from outside the state. This has meant that the poorest of the poor were either forced into working as daily wage labourers or looking for jobs outside the state. In the plain areas, in the absence of assured irrigation and second crop over a large area, rural landless could only get part-time seasonal employment within Chhattisgarh. Therefore, a large part of the labour force migrates to other parts of the country from this region.

Decentralized Food Production System

Chhattisgarh has had an amazing variety of food production systems. It is one of the last places on the earth to have a remembered history of an amazing diversity of food resources. These food resources include many kinds of rice germ plasm, a wide range of millets and other dryland crops, pulses, oilseeds, fruits, edible flowers, tubers mushrooms and other gathered foods. Many of these are dependent upon access to and close proximity of the forests.

Chhattisgarh has traditionally been known as the rice bowl of India. The region is known to have grown a very amazing diversity of rice varieties in the not too distant past. These include indigenous rice varieties capable of giving the equivalent of, or even higher yields than the green revolution varieties. These yields have again been achieved without the use of chemicals and in the field conditions of simple tribal farmers having a low resource base and little, if any, formal education. Much of our current knowledge of the diversity of rice in Chhattisgarh is based upon the pathbreaking research of Dr R.H. Richaria, the famous rice scientist of the region whose study on indigenous rice varieties was put down by the proponents of high yielding monocultures. His research demonstrated quite clearly that it was possible to obtain and maintain remarkably high yields of rice while using indigenous seeds, local resources and skills.

There has been a range of technical and production practices that the farmers of Chhattisgarh have practiced. For example, the *Biyasi* system of rice cultivation was very beneficial for the farmers cultivating on low lands. Under the broadcasting method, the farmers kept the seeds ready for sowing just before the onset of rains in June. After the seeds germinated for a little over five weeks and the water reached the height of the seedlings, the fields were ploughed with the standing crop to take care of weeds in around July-August. Thereafter, the

crop was left for growing with the villagers guarding it till harvest. The Marias of Abhujmarh practiced this type of rice cultivation under the shifting system of cultivation where these tribals burnt the trees in the forests to convert a strip of forests into cultivable land just before the rains. They then spread the ashes on the ground and waited for the rains to come before they broadcasted the paddy seeds. After this, they practiced the Biyasi system as described by Dr. Richaria, the only difference being that the Marias shifted their fields every two to three years. They only came back to the same fields after its forest cover had regenerated after a gap of thirteen to fourteen years.

Apart from cultivation practices that are akin to those of the Abhujmarias, there are several other forms of paddy cultivation. For example the Nagesias grew paddy along with other crops in the lowest portion of the uplands called the *Bahra*. The bahra was suitable for paddy cultivation because it was a low land and could retain moisture throughout the year. For this reason, the Nagesia only propagated the rice seed on these lands and no other. Then there was another type of land known as Chanwar that comprised of middle lands. Here paddy could only be grown once the monsoons came, as they did not have a capacity to retain the moisture throughout the year. However other crops requiring lesser water could be grown in this area.

There was also a variety of sowing practices known to the farmers. Apart from broadcasting, there was *Laichopi*, in which the seeds were germinated in a controlled environment and then sown. This was useful in areas/years where the rains came early, and the fields did not retain enough warmth for in situ seed germination. To cover seed shortage, the farmers knew the technique of *chaalna*, in which broken earheads were replanted in the soil using a technology of clonal propagation.

Although Chhattisgarh is chronically drought prone, the farmers here are the inheritors of a rich heritage of bio-diversity in rice and dryland crops, and this, together with great resilience has helped them survive. We need to understand this legacy well in order to plan for the future. A brief description of agricultural bio-diversity in the region, which we count as our major strength is necessary at this stage.

In Chhattisgarh a number of crops are grown viz- Rice, Kodon, Kutki, Mung and Moth, Urad, Kulthi, Lakh (Teorah), Linseed, Till, Wheat,

Grain, Tuar, etc. Here the Rabi crops like lakh, Lakhadi, Wheat Gram, Tuar are also taken as double crop on paddy fields. This practice is called "Utera-cultivation". The Utera crops are broadcast in the paddy fields when, the main paddy crop is maturing and is still standing in the field. By the time the paddy is harvested, the Utera crops germinate and are well established in the fields. The Kharif crops are dominant in this region. In Kharif crop also the rice has got a maximum area under cultivation. The diversity in rice crop found in Chhattisgarh is very extensive but is now under attrition because of the organized promotion of monocultures.

Rich Bio-Diversity

Centuries of Rice farming by indigenous communities have resulted in evolution of a rice diversity adapted to a variety of soil and micro ecosystems. These varieties have got a good yield potential under normal fertility and organic manuring. These rice varieties vary in maturity period ranging from 55 days to more than 180 days, drought resistance, and water tolerance capacity. There are low rain fall area varieties to deep water ones with standing up to 10ft. of water, short rices of 50 cm. in height to tall ones more than 150 cm. The grain size also varies from short fine to long fine, long bold to short bold and round, oval ones, beaked and awned ones, awned with various colors sizes and shapes. The kernel may be coloured white, Dull white, Red Opaque White, the grain may be of various designs & shades like Yellow, Straw Golden, Red Black, Brown, Purple, and blotches of various colours and the grains may be of various quality and scent, and protein content up to 14%. The world's longest rice "Dokra-Dokri" is found in Chhattisgarh.

Wheat is also cultivated in some areas, but the area commanded by wheat is very little. It is mainly grown in rotation with kodo-Kutki mixed with the tuar. The local varieties of wheat are Lal Kathis, safed Kathis, Lal pissi and pissi. It is believed that wheat was imported into the region in the wake of the maratha invasion of Chhattisgarh in the eighteenth century.

Farmers in Chhattisgarh are well aware of drought resistance and the ecologically wholesome nature of indigenous varieties and practices. Normally each farmer grows about 4 or 5 varieties of rice. There are a number of reasons behind the practice. If some variety fails to grow during a particular season, another would make up for it. Beside this

the farmers grow different crop varieties for their different uses and preferences; for example in Nagari region the farmers grow the “*Danwar*” variety of rice for its high nutritive and medicinal value. It is believed to be helpful as a tonic in recuperating from illness. There are a number of other rice varieties which are believed to have medicinal value, for example *Baisur* and *alcha* in pregnancy.

Dry land crops are a very major aspect of the food security of the region as assured irrigation in the area is only 13 % and supplementary irrigation is available in 35 % of the area. It is therefore of paramount importance to develop dryland crops in the region. A positive feature is that there exists a rich tradition of dryland agriculture in the region but seeds and skills have been lost due to the penetration of market forces and capital in agriculture. Many dryland crops are nutritionally very valuable, though their market value may be low. Their loss has meant serious deterioration in the diet of peasant families, as well as a loss in terms of knowledge base. This is unfortunate as many of the soils of the region (granite based with loose loam cover) are eminently suited for dryland agriculture.

Use of Uncultivated Foods

It is not possible to have a discussion on the bio-diversity in food resources without referring to the many kinds of uncultivated foods used in Chhattisgarh. These include many kinds of roots and tubers (*jimi kanda*, *keu kanda* *karu kanda*, *chind kanda* to name a few), many kinds of greens, and the many seasonal edible mushrooms. There is a large range of leaves, tree leaves, bush and shrub leaves, that are eaten here as *bhaji* s. Some of these like the *tinpania* and *chanori* bhajis grow naturally in the many rice fields after the rice harvest. As a matter of fact, the distinction between what is a *bhaji* and what is a weed is a product of the culture of agricultural monoculture that is in complete contradiction to the culture of bio diversity prevalent in Chhattisgarh. These foods lend richness to the diet and in times of drought and food scarcity it is these food resources that have sustained generations of the people of Chhattisgarh.

Chhattisgarh is poised on the brink of major changes following the creation of our new state. In the context of development processes and plans in this situation, it is extremely important that we keep in mind the crop and food bio diversity that exists and do not destroy

this precious heritage knowingly or unknowingly. This is one of the most important issues of development debate in our new state.

Decentralized Distribution Systems

In Chhattisgarh we also have several models of decentralized distribution systems.

The *Charjaniha* (literally belonging to several people) is a community based grain bank that is found in several areas of the southern hills, and variants are seen among the different tribal groups of the area. Procurement is through voluntary contributions, and/or preferential collection from the more affluent families, or those wishing in any given year to donate to a public fund. Community collections through the *Cherchera* rituals or through groups of women dancing the *Relo*, also go to build up the collection. The *Charjaniha* resources can be held in paddy, in the minor millets, and even in an NTFP product like *Mahua*, and are used for community functions, as well as for distribution to needy households in drought years.

The network of local traders or *kochiyas* were originally the link persons between the many local markets, and were the major agents in the local trade in primary food resources. It is interesting the *kochiyas* operating in the food trade were mainly women, while those dealing in forest produce or utility items were mostly men. Today, the system exists in a distorted form, with male *kochiyas* having become agents of a centralized trade system. However, the role of women belonging to the *Sonkar* (vegetable farmer) community in primary marketing survives upto the present day, and institutions like the *Turi Hatri* (women's market) of Raipur bear witness to the vibrancy of women centered local distribution networks.

Women's Role in Food Security

The role that women have played in maintaining these systems is relatively little understood. In Chhattisgarh, women are the major agricultural workers. They work in each and every aspect of crop production, preservation and storage. In certain parts of the state like Abujhmar and Sihawa, women are also known to use the plough, a function that is tabooed and prohibited for them in almost all other parts of the country. Apart from crop weeding, maturing, harvesting, women are the leading players in all post harvest and storage operations.

Women also play a major role in the collection and processing of the many kinds of uncultivated foods found in Chhattisgarh. Many of these foods are collections from the forest, and women use them for maintaining household food security and nutrition needs outside the market system.

Women are the primary gatherers of all uncultivated foods, and inheritors of an ancient knowledge system about food bio diversity. They are also the gardeners and herbalists with primary knowledge and responsibility for maintaining the home gardens, the *baris/bakhris*. Again it is the women who take the produce to the primary markets and barter or trade in the items related to primary food needs. Agricultural scientists would do well if they attempted to learn from women about their existing knowledge of seed technologies, varietal preferences, and even breeding experiences and procedures.

Women are also the keepers of the seeds. As stated above, women are responsible for all post harvest operations. An important aspect of this is the preservation of the seeds of bio diversity. In traditional Chhattisgarh, the crop to be harvested as seed is identified in the field of standing crop, and women take special care while reaping these. A wide variety of seed storage structures are used in subsequent stages, and the exact storage structure used for seed depends on the length of time the seed is to be stored away, the moisture content, and other factors. Some seeds like rice are stored in bamboo *dholgi* (or *dhongi*), thatched and sealed with cow dung, and kept away. These can last for up to three years. Other seeds like the minor millet seeds or vegetable seeds are stored in Sal leaf containers, and often hung up in the kitchen above a wood fire, so that the smoke can act as a pesticide and preservative. The extremely complex knowledge of seed storage and preservation including its technical aspects is in the hands of the women.

Today, when global markets are at our doorstep, we need to think seriously about our traditional systems of crop diversity and food as well as seed security. Any efforts to take advantage of emerging market opportunities must keep in mind that cash returns alone do not maintain food security. Our development policies too often in the past have given priority to male selective training and advancement opportunities.

Centralized vs. Decentralized systems: The Viability Debate

It is possible at this stage to introduce a debate on the viability of centralized and non centralized systems of food security in a tribal dominated state like ours. We are all painfully aware of the hunger deaths that have taken place in Chhattisgarh over the last several years. Whether or not the affected persons ultimately succumbed to bacterial infection or not is not central to the issue; the fact remains that widespread starvation and hunger have stalked this land, and that too at a time when the buffer stocks in food have been among the highest in the history of post independent India. During an investigation into hunger deaths in Wadrafnagar, Surguja, a human Rights team came upon overflowing FCI godowns, and large numbers of BPL ration cards which were totally blank. The cards were obviously blank because the BPL families lacked the purchasing power to buy grains at even the subsidized rates that were to them.

Incidents like this force us to think whether a public distribution system based on centralized procurement and centralized distribution mediated through a cash exchange ever fulfilled the food security needs of forest based communities. This is not an argument for the dismantling of the PDS, but a plea for radical rethinking about the role of the state and other institutions in understanding, maintaining, managing and bolstering food security systems that are based on different paradigmatic realities. As the work of Amartya Sen has shown, it is the enforcement of food entitlements that holds the key to food security rather than mere plentitude of production or injection of food aid..

Conclusions and Policy Recommendations

The issues involved in strategizing creatively on sustainable food security are extremely complex and cover a very wide ground. Food security issues go beyond food production through agriculture and its procurement alone. The main points of the discussion and the main policy recommendations can be thus summarized below:

Sustainable food production and procurement systems depend on an intermix of cultivated, uncultivated and gathered foods. In societies under such regimes, it is not possible always to separate agriculture from food collections that are largely based on the forest. Many of the

foods of the tribal people in the peripheral hills and forests of Chhattisgarh are available in the form of random seasonal collection, digging, gathering, and plucking. The food security systems thus existing include a wide bio-diversity of cereals, pulses, oilseeds, indigenous fruits, flowers, vegetables, greens, tubers, and mushrooms. The cereals that form a part of such systems include diverse varieties of each kind (for eg. Rice, Maize, Minor Millets) that are adapted to different soil, moisture, and other climatic factors, and have been developed by the communities growing them over centuries.

A large part of the reasons why forest communities are relatively unfamiliar to stark hunger and severe malnutrition lies in this complex inter relationship. This relationship is currently endangered through state and commercial intervention, with large communities of forest people being enclosed out of entitlements to the forest.

Today, this agricultural bio-diversity is under attack, and much of the crop diversity that once existed is lost. We do not have a complete documentation of the crop diversity that was/is our heritage; however, the bio-diversity in land races of rice is among the better-documented examples. The work of Dr. R.H. Richharia established the existence of over 1500 differentially eco-adapted strains of rice alone; however, this work on the collection and documentation indigenous rice strains faced severe political opposition. And had to be shut down. Much of the germ plasm collection that was generated in the course this path breaking research is today corrupted, and only goes to prove the point that bio-diversity preservation can only exist in a live process, not in a laboratory situation.

Forest based food collection systems have faced attack from the clearing of the forests by the forest department for the commercial extraction of timber and other products like the Tendu Leaves. The institution of monocultures of commercially "useful" species has further weakened the system. The contribution of forest communities to the preservation and sustainable development of the forest needs to be understood and promoted.

The situation in which all forests are owned by the state in what is defined as "public" interest, and agriculture is practiced on a "private" basis creates further problems. Despite all the rhetoric of "joint" management of forests, and despite their strong dependence on forest

food resources, communities in fact have very little control over the way forest resources are to be used. The forest protection and village forest committees are given the task of managing degraded and good forests for better tree species growth, not for better utilization of forests for food and other community resources.

While the government continues to provide price support to agricultural produce, there is no similar support provided to the collectors of forest produce. NTFP collectors are predominantly women, and while their collections generate huge profits at the value added stage(s), the wage and livelihood security of the primary collectors remains extremely fragile. This factor, together with the commercialization of forests contributes to the increasing food insecurity of forest communities in recent years.

The head points of water resources in tribal and forest areas are also similarly located in state owned forest areas, making it difficult for people to manage water resources in community interests. In this situation a further element of dis-empowerment for community food security is introduced when the forests are seen as rich repositories of medicinal plants, and commercially "viable" non timber forest produce. In the context of global markets and TRIPS, these dangers have actually increased.

Technology aspects of food security systems are extremely important. For eg., the women of Chhattisgarh have living experience of a wide diversity of seed and grain storage technologies that are specific to different seed types and requirements. Market aspects of food security systems too are similarly crucial. The local markets today have degenerated into points of exploitation where cartel representatives buy forest products at throw away prices. They can and do also act as places where communities exchange food resources among themselves. For women they are a major source of livelihood security. The latter role needs to be strengthened. Sustainable food security systems include sustainable food storage and distribution systems, like community grain and seed banks. Management structures of these systems are however, often in the hands of patriarchal community elders or elite. Work needs to be done on democratizing management structures of community institutions and in increasing women's participation in these processes. Women play a major role in maintaining sustainable food security systems.

Their economic roles however are often not matched by their political control over the systems they create with their blood and toil. These need to be strengthened. For sustainable food security systems, it is important to recognize the role that women in forest communities play as upholders of food security at household and community levels, and to evolve strategies that are able to build upon this role.

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Role of Women in Sea Farming - A Societal Programme

**M. C. Remany, M. Vijayakumaran,
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The authors of the article, Dr. Remany and her colleagues are from the National Institute of Ocean Technology, Government of India. Women of many of the fishing hamlets in our country are involved in shore-based fishing related activities like net cleaning, marketing and sorting the catches. The scope and participation of women in sea farming/aquaculture production in a particular area is influenced to a large extent by the level of available technology *vis a vis* the role and status of women in that society. Development of technological design that would suit women's needs and physical capacity will boost up the role of women in this sector. The technology developed by the National Institute of Ocean Technology (NIOT) on lobster and mud crab fattening, under Ocean Science and Technology for Islands is one of such kind. Technology already disseminated at Tharuvaikulam (Tuticorin) and Havelock (Andaman and Nicobar) in the areas of sea farming for the benefit of coastal community, particularly for the womenfolk, are expounded in this article.

Introduction

In India, it is estimated that 5.4 million fishers are fully engaged in fisheries/aquaculture activities, of which 3.8 million are men and 1.6 million are women. As aquaculture became more intensive and commercial in nature, the role of women in this sector got adversely affected.

Gender analysis by institutions and organizations working for the development of aquaculture infers that conducting workshops, meetings, training and extension programs for women can boost up the role of women in this sector.

Good practices which ensure women's role in sea farming includes training and extension programmes that recognize women's time use,

household responsibilities, literacy levels, daily chores etc. Above all, the technology developed should suit the women's needs and physical capacity. Realizing this urgent need to develop and disseminate suitable technologies for the benefit of coastal communities, the National Institute of Ocean Technology (NIOT) Department of Ocean Development, Government of India, developed economically viable technologies for lobster and mud crab fattening, as a part of the Ocean Science and Technology for Islands (OSTI) programme. Sea farming in cages was initiated by NIOT in Tharuvaikulam, Tuticorin district and Havelock Islands in Andamans. Based on the resource availability and facilities, the women beneficiaries in the coastal communities were trained in these income generating alternative livelihood programmes with technical back up for implementation and successful running of the projects.

Need for lobster and mud crab farming

The high demand for live spiny lobsters and mud crabs particularly in South East Asian Countries and its high price have resulted in targeted lobster and crab fishery in India leading to over exploitation. More than one-third of the lobsters caught in India are below 150g, with a major percentage below 100 g, and are exported as live or whole cooked lobsters. Live lobsters of even less than 100g were exported to countries like Taiwan and China, where it was fattened for value addition. Since, no other country permits juvenile lobster exploitation, India was targeted for juvenile lobsters. To avoid targeted fishing of juvenile lobsters and to protect the breeding stock, the Ministry of Commerce, Government of India banned export of undersized lobsters and also the egg bearing females by a Gazette notification in July 2003. Green lobster, *Panulirus homarus* below 200 g and *Panulirus polyphagus* below 300 g, Tiger lobster, *Panulirus ornatus* below 500 g and sand lobster, *Thenus orientalis* below 150 g are not allowed to be exported from India, by this notification.

However, since there is no ban on catching the undersized lobsters, it will continue to be a major portion of the lobster catch in India. The best way of utilizing the juveniles caught in the fishery is to fatten them to bigger sizes for value addition. Fattening can also be used for value addition of bigger lobsters and for growing lobsters in late or early moult stages, which do not survive transportation. The price of juvenile lobsters fluctuates seasonally. It is about Rs.200 – 250 per kg and when

grown to over 200g, it will fetch a price of Rs.650-800 depending on the species and season.

Similarly, among the cultivable shellfishes mud crab (*Scylla serrata*) is considered as one of the important seafood items due to its delicacy and larger size. Since our Islands are bestowed with rich mangroves, mud crabs are available in large numbers at present and their trade in our region is showing consistently an increasing trend. The unemployment problem is rising in our islands due to dwindling government job opportunities and lack of industries. The mud crab resource is a natural bounty for our islands, which has a potential to change the socioeconomic status of the island communities. If the coastal poor, fishermen and educated unemployed youths take up crab culture or fattening in an eco friendly way their economic status can be improved. At present the fishermen, in our islands, sell small crabs and commercial sized post moult stage crabs (water crabs) at a very low price to the exporters, who transport them live to foreign countries, where they are cultured or fattened for selling at a very high price! These small crabs can be fattened to marketable size by our islanders to obtain better profit margins.

Based on the aforesaid facts, the Andaman & Nicobar Centre for Ocean Science and Technology for Islands (ANCOST), a field unit of NIOT, decided to educate and train the islanders about the potential of crab fattening and help them to achieve economic prosperity.

Development of technology

a. Lobster fattening

Growing of juveniles to bigger sized adults is termed as 'fattening'. The technology for lobster fattening was first developed in indoor systems in OSTI sea front laboratory situated in Neelankarai, Chennai. Promising results were obtained in the various experiments conducted on fattening. Lobsters attained an average monthly growth rate of 28.9 g when reared in indoor systems on a diet of mussel meat. Good water quality management and disease control measures, improved the growth and survival of lobsters.

b. Crab fattening

Crab fattening involves holding of freshly molted crabs (also known as water crabs) for 10-30 days until they become hard or are completely

“fleshed out” or growing baby crabs (juveniles) of 10-100 g and allowing them to molt and grow on a diet of mussel meat, chicken waste/trash fish. The crabs attain 400-500 g size within 3-8 months.

Dissemination of technology to the coastal community

The technology dissemination programme (fig.1) taken up by NIOT was conducted in two phases - Phase I (demonstration of technology) and Phase II (extension of technology).

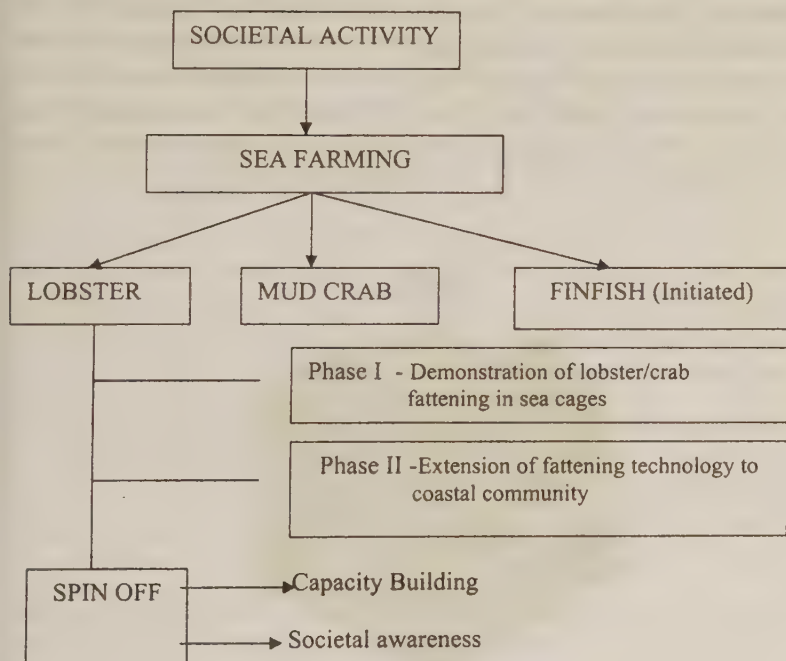


Fig.1. Technology dissemination programme by NIOT

Phase I – Demonstration of the technology

Lobster fattening in sea cages was demonstrated to the coastal community at Tharuvaikulam, Tuticorin with active participation of the Department of fisheries, Government of Tamil Nadu and the local Panchayat.

Site selection: The site Tharuvaikulam (Lat 8° 50.10' S; Long 78° 11 00' E), a small fishing hamlet off Tuticorin district was selected for the lobster farming activity. The selected site was easily approachable and

less prone to natural calamities and pollution. The intensity of fishing activities was also less in this area. The seabed was found to be suitable for anchoring the cages. The availability of juvenile lobsters and natural feeds such as clams, trash fishes and crabs rendered the site more suitable for culture. Above all, the interest shown by the beneficiaries (coastal fishers) to take up this activity was appreciable.

Deployment of cage and stocking: Four beneficiaries were selected from the fishing hamlet Tharuvaikulam, for the demonstration of the sea farming activity. A cage designed by NIOT was distributed to each of them. The cage had a main frame made of 2 ¹/₂ inch diameter GI Pipe with steel woven mesh (2m x 2m x 1.2m) and four inner compartments (0.75m x 0.75 m x 1.1m) with two layers of nylon mesh of sizes 15mm x 15mm (inner) and 5mm x 5mm (outer) (Figure 2).

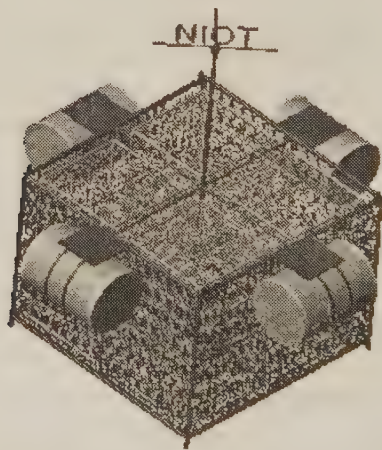


Fig.2. Lobster cage designed by NIOT

The cages were deployed on 15 May 2003 and juvenile lobsters were collected by the beneficiaries and stocked in all the four compartments at a density of 25/m². Initial body weights of individual lobsters were recorded to get scientific data on the growth performance. Fortnightly/ monthly visits were made by the NIOT scientists and the staff of the Department of Fisheries for monitoring the cage, lobster health and weight increment.

Feeding: The fishers were trained to feed the lobsters and the lobsters were fed with the feeds available near the site. Approximately 50-60 nos. of clams/mussels amounting to about 3 % of live body weight of lobsters were fed per day. Anticipating the enhanced need for live feed when cage culture is to be expanded, NIOT also initiated green mussel *Perna viridis* culture on ropes and bags, near the cage culture site. This back up not only provided ample supply of food for the lobsters but also helped the beneficiaries to avoid dependence on the seasonal availability of the feed for the lobsters. This is the first successful culture of green mussel in the sea around Tuticorin and has the potential to be expanded to provide additional income to the coastal fishers.

Cage maintenance and monitoring of health status of lobsters: Periodical cleaning of the cages was done to remove any adhering organisms. The lobsters were monitored regularly to check for the presence of any infestations of epibionts colonizing them. If any algal growth was observed on the exoskeleton of the lobsters, it was removed by scrubbing gently with a toothbrush. Frame of the cage was periodically checked for corrosion and the joints were also inspected.

Growth of lobsters in Sea cages: The lobsters reared in sea cages attained an average monthly growth rate of 35.00 g. Tiger lobster (*Panulirus ornatus*) of mean initial body weight of 150 g attained an overall weight of 430 g and green (*P. homarus*) of initial body weight 110 g displayed 320 g at the end of the fattening period of six months.

Harvesting: Lobsters attained marketable size (>250 g) over a period of six months and were harvested and auctioned at the rate of Rs 1000 per Kg.

Mud Crab Fattening

NIOT also disseminated the technology for fattening of mud crabs in FRP cages. This activity was undertaken in Havelock Islands, Andaman & Nicobar region, in order to demonstrate the fattening of water crabs (freshly molted crabs) and juvenile crabs to a marketable size, which would serve the islanders to earn more revenue.

Site selection: Appropriate site in the mangrove area with adequate tidal flushing was selected for deployment cage.

Cage design: Cages of dimension 1m (L) X 1m (W) X 0.4 m (H) with 9 numbers of even sized cells were used for crab fattening. The cage has one top door for feeding and monitoring the crabs.

Stocking and feeding: The animals were fed on clam meat, chicken waste and mussel meat.

Growth assessment and harvesting: Growth assessment was done at monthly intervals. Harvesting was done after 3-8 months or as and when the crabs reach 400-500 g size.

Phase II- *Extension of the technology*

After successful demonstration of lobster fattening programme to coastal communities at Tharuvaikulam, Tuticorin requested the NIOT to extend these activities to more beneficiaries and villages. The fishers from Tharuvaikulam requested NIOT to provide additional cages for this programme. The enthusiasm shown by the fishers and the promising results obtained encouraged NIOT to design and fabricate modified cages. On the basis of the field experience, new improvised cages were fabricated and distributed to the beneficiaries particularly to women self-help groups.

Training imparted to Self Help Group

After realizing the profit in the pilot scale sea farming activity for lobster fattening, the District collector, Tuticorin requested NIOT to implement this programme in large scale through District Rural Development Authority (DRDA) for which the funds were released by DRDA with 30% subsidy. Accordingly, NIOT conducted a series of training programmes for the members of women self help groups. The training programme focused on the technological aspects developed by NIOT for fattening juvenile lobster and crabs in the sea cages, funding procedure and the benefits of open sea cage culture. Very recently, NIOT formed a Self Help Group (SHG) titled "Aqua crab farming SHG" at the Laxmipur village of Diglipur, Andamans. All infrastructural and technical support for mud crab fattening were given to the SHG by NIOT. Profitable outcome was generated by the SHG during the first harvest itself.

Spin off

a. Capacity building among womenfolk in island community

Women who had no opportunity to be educated above elementary school level and those who are married in early teens gained experience in the sea farming activity. Fattening of lobsters and mud crabs proved to be a great success in terms of generating extra income to the women self help groups (WSHGs). Active participation of the womenfolk, infrastructure support from the district administration and technical back up from NIOT made the societal programme a great success. Until recently, all the SHGs were concentrating only on small savings. After the initiation of the training programmes for alternative livelihood, they started to venture into these revenue-generating activities, which served them to earn more income.

b. Societal awareness

The women being the potential workforce for effective conservation of resources played a significant role in management practices through the alternative livelihood programmes implemented by NIOT. The beneficiaries were taught to distinguish between male and female lobsters and they were educated to retain the egg bearing lobsters in cages and allow the eggs to be hatched so that the larvae/young ones would be released into the sea. The importance of sustainable environmentally safe sea farming activity for the welfare of the humankind.

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Epistemology, Science and Feminism: A Philosophical Analysis

S. Panneerselvam

A well-known philosopher in the country, the author is professor of Philosophy in the University of Madras, and is conversant equally in the Indian and Western tradition. In this contribution, he engages us with the complex problematic of the relationship between science and philosophy, and thus provides as the key to be able to understand the human and societal issues connected with the emerging biotechnology. He discusses the issue of claims of neutrality, and explains the feminist philosophy of science and its critique of the present-day scientific and technological enterprise. Panneerselvam notes that "the implication of feminist science is that social belief and values have a role to play in various sciences". This is applicable to biotechnology as well.

... [T]he feminist turn is not merely the introduction of problems of women, in the private and public orders; what differentiates it from a sociology of women or women's studies is that a feminist theory is a way of understanding the totality of life, including that of men, in a new register. As such, it institutes a new epistemology and a new moral vision—the epistemology of participation and the ethics of relationship.

— R. Sundara Rajan, *Beyond the Crisis of European Sciences*

The empiricist-derived epistemology that had directed most social and natural scientific inquiry... explicitly holds that historical social relations can only distort our "natural", "trans-historical" abilities to arrive at reliable beliefs.

—Sandra Harding, *The Science Question in Feminism*

Philosophical Responses to the Crisis of Natural Sciences

Philosophy deals with two types of questions: the first one deals with the issues that science (like physical, biological, social, behavioral) cannot answer and perhaps may never be able to answer and the second, questions regarding why the sciences cannot answer the first set of questions. Philosophers, scientists and others who defend the integrity of science as an instrument for the acquisition of objective knowledge have long opposed granting equivalent standing to non-scientific ways of belief-information.

Science is often considered as the source of objective knowledge. But one can raise the following questions, namely, how it secures such knowledge and also whether there is alternative source or means of securing it. Science as a human activity is one response to understand the world. It claims to provide objective explanations superior than that of all other alternatives. From the time of Descartes and Newton, the questions about the nature, extent and justification of knowledge, and in particular scientific knowledge, dominated philosophy as well as science. In the twentieth century, philosophers of science found answer in empiricism according to which knowledge is justified by experience and this means the truths of science are not necessary but contingent truths, and that knowledge could not be extended beyond the realm of experience. Based on this epistemology, the school of logical positivists or logical empiricist emerged.

Recently, some natural as well as social scientists, historians, sociologists rejected the claim that the methods of science are open to assessment from the standpoint of philosophy and the notion that philosophy might dictate to any other discipline how it should proceed. The social scientists and the feminists and post-colonial scholars try to explain the character of science as the product of patriarchal or rationalist agenda. It is argued that there is sexism among scientists—for example, constructing human research populations that exclude women or minorities—or racist pursuit of evolutionary research.

Science plays an important role in the modern society. Science is often seen as possessing an absolute objective character that God held in medieval theology. It is often claimed that technology is nothing but applied science. According to A.N. Whitehead, there is a “fallacy of the detached observer” by which, modern science had wrongly separated

the experimenter from the experiment. The traditional view of science that it is absolutely objective is nothing but a myth and we need a more humanistic view of science. The view that science as absolutely objective and completely removed from the cultural context of the scientist has been questioned by the philosophers of science. Kuhn formulated the view that social and institutional factors directly influence the nature of scientific theories. Those thinkers who claim value neutrality for science dehumanize science and distract us from the realization that the very choice of what constitutes a scientific explanation depends upon the value-laden choice. Science without internal human values could not be science.

Philosophers have tried to explain the distinction between science and non-science. Popper for example has explained the progress of science in terms of bold conjectures which scientists attempt to falsify rather than confirm. What makes a conjecture a scientific one is that it is open to be tested and perhaps refuted. Theories, which are in principle immune to the refutation, are not scientific. Similarly, Kuhn described a psychological experiment, which explains the nature of scientific discovery. The history of science is characterized by periods of normal understanding within which scientist work. Scientists working within the received paradigm will not give up it easily, even in the face of anomalous results. Feyerabend attacks science and scientific education. He claims that science is simply a form of ideology like any other ideology.

Sundara Rajan's *Beyond the Crisis of European Sciences: Towards New Beginnings* criticizes the Eurocentric bias of science and explores the possibility for a new path. He talks about the "European themata" i.e., the general features of style and motivation, which seem to characterize the modern sciences, and to explain the need to develop a conceptual framework for understanding of science and also to support the relationship between science and philosophy. Professor Sundara Rajan wants to develop a four-fold framework of science — science as a possibility, science as a fact, science as a problem and science as a hope,¹ which he thinks, can solve the crisis of the natural science.

1. R. Sundara Rajan, *Beyond the Crisis of European Sciences*, Shimla: Indian Institute of Advanced Study, 1998, p. 203.

In the first context, *i.e.*, science as a possibility, philosophy is facilitative. The critical approach of philosophy is helpful to science. In the second, science as a fact, there is a radical change in the relation between philosophy and science.² Philosophy has to help science by analyzing social reality. Analysis and clarificatory procedures of philosophy are immensely helpful in the understanding of the basic principles and methods of sciences. In the third context, *i.e.*, science as a problem adopts the critical function of philosophy. Here, philosophy takes the possibility of a critique of sciences in terms of a normative understanding of life. The crisis of the sciences is approached by philosophy to solve it. For example, the role of science in the politics of domination and colonization has been questioned, and here philosophy comes to its rescue. In the fourth and final context *i.e.*, science as hope, we allow new possibilities, taking into consideration its failures and limitations. This means one needs new self-understanding. This is possible through the "thematic dimensional approach" which for example, Holton prescribes.

There is a relationship between philosophy and human sciences. This relationship is quite often not approached seriously. But one needs the other and one is not a threat to other. Each discipline must enter into a dialogue with the other, thus giving the scope for new thinking both in philosophy and science. Taking two paradigms of Popper and Khun, Sundara Rajan argues that for Popper, science and philosophy are very close in spirit and motivation.³ But for Khun the relation is a variable one and sometimes they are indistinguishable also. The difference between the two thinkers is that while Popper insisted on the role of philosophers in science, Khun is of the view that philosopher misses the rhythm of science.

A Feminist Epistemology of Science

In the 1980's feminist critique of the philosophy of science was directed towards the logico-empiricist traditions to which philosophers like Carnap, Hempel, Ernest Nagel and others belong. Many feminists during this period made a significant contribution to the philosophy of science. For example, Helen Longino in her book, *Science as Social*

2. Ibid., p. 21.

3. Ibid., p.17.

*Knowledge*⁴ published in 1990 supports Quine's underdetermination thesis to argue for the plausibility of science. Similarly Potter Elizabeth⁵ talks about the relationship between gender politics and science. Sandra Harding's *The Science Question in Feminism*⁶ recognizes the rejection of the distinction between synthetic and analytic distinction. She has also argued against the scientism associated with the understanding of philosophers of science.

Quine challenged the logico-empiricist philosophy of science by rejecting the analytic and synthetic distinction and also the principle of verification. Quine made an attempt to naturalize philosophy of science. According to him, traditional philosophy of science should be rejected in favour of self-conscious science for a "reciprocal containment of science and epistemology". Quine is often approached from the feminist perspective for the main reason that he supported the notion of holism or communitarianism procedure of gaining knowledge. "I see philosophy not as an *a priori* groundwork for science, but as continuous with science. I see philosophy and science as in the same boat - a boat which, to revert to Neurath's figure as I so often do, we can rebuild only at sea while staying afloat in it. There is no external vantage point, no first philosophy. All scientific findings, all scientific conjectures that are at present plausible, are therefore in my view as welcome for use in philosophy as elsewhere,"⁷ says Quine.

Quine views that the old epistemology aspired to contain natural science, whereas epistemology in its new setting is contained in natural science, as a chapter of psychology. We do not know the world as it is in itself but only through sensory evidence which means that epistemology becomes empiricism. This relationship of epistemology as the handmaiden of science is what Quine calls, "epistemology naturalized". It is based on three important principles:

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4. Helen Longino, *Science as Social Knowledge*, Princeton, Princeton University Press, 1990.
 5. Potter Elizabeth, "Gender and Epistemic Negotiation", in *Feminist Epistemologies*, Alcoff and Potter, (ed.), 1993.
 6. Sandra Harding, *The Science Question in Feminism*, Ithaca, Cornell University Press, 1986.
 7. W.V. Quine, "Natural Kinds", in *Ontological Relativity and Other Essays*, New York: Columbia University Press, 1969, p. 39.

1. The traditional or classical epistemology, according to which we gain knowledge though *a priori* criteria, is no more acceptable.
2. Skepticism is a pseudo problem.
3. Science, as an extension of common sense and based on the method of verification, is our only guide to truth.

A study of Quine would reveal the fact the he has made a significant contribution to the feminist philosophy of science and feminist epistemology. His naturalism is important in feminist theorizing of science. Quine's paper, "Two Dogmas of Empiricism" challenged the logico-empiricist philosophy of science. In her book, *Who Knows: From Quine to a Feminist Empiricism*, Lynn Hankinson Nelson⁸ argues in favour of Quine and says that his position is an advancement over the position of Carnap, Hempel, Nagel and Kuhn and there are many similarities between Quine and the feminist understanding of science. Further Lynn Nelson says that Quine's naturalizing philosophy of science has a relevance to feminist philosophy of science. Basically it rejects the traditional understanding of epistemology of science. She reopens a discussion of feminism and empiricism and the arguments, which she offers for feminist empiricism, are reactionary. The two areas which are helpful for the feminist understanding of science are: (1) Naturalism and (2) holism.

The Science Question in Feminism

Lynn Nelson argues that there should be viable empiricist philosophy of science. She offers some alternative to what Sandra Harding calls "the philosophy of science question in feminism". The alternatives are as follows:

1. The first alternative has to do with the characterization of empiricism sometimes assumed by feminist science scholars. The contemporary philosophy represents rather a far more radical departure from traditional and positivist empiricism than often taken into account by feminist critics of empiricism. The task of reconciling feminist science with empiricism is very different from what it would be if we were limited to logical positivism or the post-logical positivist tradition represented by Carnap and others.

8. Lynn Hankinson Nelson, *Who Knows: From Quine to a Feminist Empiricism*, Philadelphia, Temple University Press, 1990.

2. The second alternative is that those insights of feminist science scholars that have been understood to require "anti-empiricist solutions" will need to be incorporated in any viable empiricist philosophy of science. This suggests the view that anti-empiricist approaches can be avoided, and that most valuable implications of feminist and other critical science scholarship are commensurate with empiricism.
3. The third alternative is also related to frameworks, such as feminist standpoint theories.

The traditional philosophy of science demanded rigid boundaries between epistemology, metaphysics, science and values. But in the last three decades, research into the assumptions, theories, and practiced of the sciences, and into the social and political contexts in which science communities are located, has demonstrated interrelationship between all of these activities. No doubt, we are empiricists and we need empiricism. But a distinction between empiricism as theory of evidence and empiricists account of science should be made. For example, Sandra Harding's critique of empiricism is seen in *The Science Question in Feminism*. She speaks of three different ways by which feminist scientists approach the problem: (1) feminist empiricism, (2) feminist standpoint theory and (3) feminist postmodernism.

Lynn Nelson's interesting paper, "Feminist Naturalized Philosophy of Science" analyses to show the importance of Quinean naturalized philosophy of science and also how the feminist scientists can make use of this in their understanding of science. Ever since the paper, "Epistemology Naturalized" by Quine was published in 1969, naturalized philosophy of science has become part of the philosophical method—just the part of what the philosophy of science and epistemology are for practicing philosophers. The naturalized philosophy of science is distinct from the traditional epistemology. What is naturalization? Though the methods and theories of naturalized philosophy of science are not forever fixed, it is both possible and appropriate to judge methodologies, and the research programmes and analyses they shape, as sufficiently or insufficiently naturalistic. Lynn Nelson prescribed three criteria for naturalization:

- 1) commensurability with the actual history and contemporary practice of science.

- 2) grounding in scientific research that carries implications for a theory of theorizing as in the case of empirical psychology, social psychology, cognitive science and evolutionary biology.
- 3) consistency of methodological principles, *i.e.*, a consistent approach to the role of social factors in periods of consensus and dissent.

Lynn Nelson contends that Quine's claim that the philosophy of science is continuous with science and should be pursued as such, is important. In this context it is appropriate to say that for Quine, the philosophy of science should draw on current research and theories in the sciences and its own methods and theories are to be judged by the standards. Also for him, like the sciences, the philosophy of science is normative using criteria such as empirical success to judge whether theory adoption in science is progressive or not. Thus naturalism takes the goal of science and naturalized philosophy of science to be the construction of theories that organize, explain and predict experience. From the above view of Quine, the feminist philosophy of science, Lynn Nelson develops her thesis that philosophy of science is continuous with science.

The implication of feminist science is that social belief and values have a role to play in various sciences; they have shaped the research questions, though there may be disagreement about the implications of it. She says that the evidence supporting a specific theory, hypothesis, or research programme is constituted by observation. For her, there are two kinds of evidence for individual theories, the experience based on observation and that which is constituted by bodies of accepted methods, standards and theories.

Lynn Nelson suggests that in the philosophy of science, there should be a shift in focus from individuals to communities and the abandonment of the commitment to a hard and fast boundary separating good science from social beliefs and values. Her aim here is to develop a social empiricism. Longino Helen's *Science as Social Knowledge* and Miriam Solomon's paper, "Social Empiricism"⁹ are written in this direction. A holistic and inclusive theory of evidence is the basis for social empiricism and a normative philosophy of science. Lynn Nelson presents a case study to show that when evidence is construed holistically, science

9. Miriam Solomon, "Social Empiricism" *Nous* 28 (3), pp. 325-43, 1994.

communities are not closed systems. She presents a case study cited by Geschwind and Behan, Diamond et. al. In 1981, in the Journal, *Experimental Neurology*, an article, "Morphologic Cerebral Cortical Asymmetry in Male and Female Rats"¹⁰ was published by Diamond et.al. It is reported that two areas of the cortex of male rat brains 3% thicker on the right side than the left, and had proposed that the thickness was caused by androgens and related to right-hemisphere lateralization. The evidence provided by Diamond and others for this hypothesis included the ability to reverse the lack of asymmetry in female rat brains by removing the ovaries at birth; other studies reporting sex differences in asymmetries in weight, structure and size of the hemispheres in rats. But this view was severely criticized by feminist biologists in the 1980s.

The research of Diamond and others had established a thickness in small areas of male rodent brains but not relationships between the thickness and lateralization and that the hypothesis of sex differentiated laterization to which Diamond and others claim. Many feminist scientists have shown that the above view of Diamond and others is wrong. They criticized the emphasis on the organizing effects of androgens and challenged various hypotheses concerning their effects. They also challenged the linear explanatory model that Diamond and others presumed, and in particular the extrapolation of the model to humans. The critics also point out that hypotheses positing sex different lateralization themselves rely on controversial hypotheses concerning sex differences in cognitive abilities. Many feminist biologists questioned the rationale for looking for a biological foundation for the sex differences alleged.

Helen Longino argues that instead of a feminist epistemology we really need turn our attention to the notion of "doing epistemology as a feminist" which is to engage the questions of epistemology with an awareness of the ways in which epistemological concepts like rationality and objectivity have defined in terms of masculinity. She argues that we understand feminist epistemology as practice rather than content, which draws critical attention to the ongoing motivations, questions, and methods in doing epistemology, and thus subscribes to the kinds of

10. Geschwind and Behan, Diamond and et. al, "Morphologic Cerebral Cortical Asymmetry in Male and Female Rats", *Experimental Neurology*, (71), 1981.

considerations of verb-sense epistemology. The feminist epistemologist, Lorraine Code in her paper, "What can She Know?" makes a distinction between noun-sense epistemology which focuses on set of condition, definitions and strategies, and verb-sense epistemology, *i.e.*, feminist epistemology.

Both in feminist epistemology and feminist philosophy of science, there is a debate about the differences among feminist empiricism, standpoint epistemology and feminist postmodernism as feminist epistemological positions. For example, we can see this in Sandra Harding's writings. Also in Phyllis Rooney¹¹ we see a distinction between what naturalist epistemologists do and what they say they ought to do. She says that although naturalists are committed to making substantive use of scientific research in their theorizing about knowledge and science, they typically do not do so. According to her, those who subscribe to a noun-sense of epistemology take a specific fixed theory of knowledge as their goal and in this way they are committed to final philosophizing of epistemology. Against this, the verb-sense epistemologists are concerned with doing epistemology and are more likely to devote critical attention to particular kinds of motivating concerns, questions and methods.

The political theory of feminism is discussed at length in the background of communities and civitas. At the methodological level, there are two pairs of distinction *i.e.*, between the signification and symbol and decontextualization and recontextualization. The tension between feminism and the politics can be resolved by a dialogue, which can redefine one's own position in the light of that dialogue. Here a distinction is made between the early feminism and the feminist theory after the influence of post-structuralism and post-modernism. By making the distinction between the "private" and the "public", the suppression of women in the families was hidden. Women were subjected to multiple violence and thus we have to think of politics of emancipation in various ways.

The feminist dictum that the personal is the political is significant because it gave a new feminist understanding which consider the deeply

11. Her papers like, "On Values in Science: Is the Epistemic /Non-Epistemic Distinction Useful?" (1992), and "Rationality and the Politics of Gender Difference" (1995) explain this.

hidden political determinations at work in the personal life of women. Feminists encounter with post-modernism is something, which needs a careful study and attention. Though some of the feminists like Lynda Nicholson and Nancy Fraser are more sympathetic towards post-modernism, their criticism that it is a regress theory has to be analyzed before arriving at a conclusion. Post-modernism affirms the politics of difference and negates the identity and sameness. New feminism also supports diversity and difference.

Thus at the starting point itself, post-modernism and feminism have some common ground and Seyla Ben Habib's criticisms of some of the assumptions and presuppositions of post-modern theory may not be valid. For her, it is an assault on the philosophical assumptions of subject-object relation, which was important for the modernists. Because of this, there is a shift from epistemology to language and it is a fact that post-modernism celebrates language. One can see the synthesis of feminism and post-modern theory in the feminists like Fraser and Nicholson. In fact, some versions of feminism are inherently post-modern; like the feminists, the post-modernists valorize differences, otherness, heterogeneity, diversity and fragmentation. The two discourses always can work together. The dialogue between them can help to generate new perspectives for social theory. Feminism can also modify post-modern theory, just as post-modern notions can help in producing different versions of feminism. Post-modernism adjusts its politics to its philosophy whereas feminist theory approaches philosophy from the other side.

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The Sociology of Scientific Knowledge: A Feminist Intervention

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The author is professor in Sanskrit University, Kalady, and a former student of the University of Madras. She argues in this article that external values do not play a negative role in scientific knowledge. She examines ways to accommodate them without hindering scientific objectivity. The paper also aims to show how science is importantly a social enterprise and how researches need to include the perspective, values and concerns of the marginalized, specially the woman. All this has important implications for contemporary researches in biotechnology, all the more so because they affect women, and has serious consequences for the life of the marginalized.

In the past, scientists were depicted as lone geniuses who were able to examine evidence and reason in an unprejudiced manner, so as to arrive at important truths. This is in keeping with the Cartesian picture of knowledge, according to which, those who wish to know should begin by stripping away their social and personal influences, in order to examine claims in the natural light of reason. Recent studies show that this picture of science is a caricature. The history of science also contains stories in which, theories accepted were not always justified by evidence, but rather by factors external to evidence-list. For instance, a theory could bolster the position of the social group to which a particular scientist belongs. If this be so, some sociologists have argued for the need to study how science is socially structured, in order to prevent such external factors from having an undue influence.

Among studies that claim to have shown the influence of external factors on science, *feminist studies* are in the forefront. Feminist researchers have plausibly argued that the ways in which scientific data are collected, and the manner in which hypotheses are formed and

justified on the basis of the same data, are often affected by such values. For example, scientists who believe that women should not play a prominent role in public life often gather data badly, and use poor inferences to support the claim that women by nature are not suited for such a role. From Aristotle to our times, the shoddiness of such a research has passed virtually unnoticed.

Scientific Theories on a 'Strong Programme'

In recent years, there has been a great deal of work done in the field of history of science to show that scientists are led to accept theories by external social factors rather than just by the evidence. Sociologists Barry Barnes and David Bloor propose that scientists always accept theories partly because of external factors¹. In fact, observation, experiment and reasoning play only a small part in narrowing down the range of theories a scientist will accept. As per the 'strong programme' of Barnes & Bloor, whether a theory is credible/justified is not a matter of inference from that data to the theory. If the strong programme is right, the current scientific knowledge is determined more by social influences than by empirical data. Though the strong programme is a kind of relativism, it is not logically problematic, it is claimed. For, it does not deny that some theories are true and others are false, or that some are rational and others irrational. Further, it does not say that what makes a statement true is dependent on the standards of the group which accepts it. In fact, other kinds of relativism are paradoxical. For, the claim that all beliefs are true implies that the belief that not all beliefs are true is also true!

Barnes and Bloor distinguish the strong programme from a hypothesis they call the *weak programme*. The weak programme holds that *sometimes* scientists accept/reject theories merely because of social influences which have nothing to do with the data available. The weak programme is neither a form of relativism, nor a questioning of the objectivity of science. Let me illustrate the matter with an example. Consider a powerful group of male scientists, concerned to preserve the social status of males, infer from research findings which are in themselves open to different interpretations, that it is a fact that women by nature

1. Barnes and D. Bloor, (1982) 'Relativism', Rationalism and the Sociology of Knowledge in M. Hollis and S. Lukes (eds), *Rationality and Relativism*, Oxford: Oxford University Press, pp.21-44

are intellectually inferior. The few women scientists, concerned to preserve their status and research funds in a male dominated scientific community, defend the view that research shows that generally women are intellectually inferior. Students learn to present the received view, so that they are able to get a pass mark in their examinations. Fresh researchers tend to go along with the consensus about the intellectual inferiority of women in order to get their papers published. The public tends to accept the claim that women are inferior. This goes on and on. Here an advocate of the weak programme would hold that a deplorable use of prestige and power has resulted in the public being misled about the strength of the evidence for the hypothesis. An advocate of the strong programme, on the contrary, would hold that the claim that women are intellectually inferior is part of current scientific knowledge, though it may not be true.

The proponents of strong programme claim theoretical advantages to it over rival programmes, adducing the following reasons: First, it prescribes a common epistemic method to all beliefs, unlike the rationalists who maintain that rational beliefs do not need to be explained causally, but irrational beliefs must. Second, it is a fact that empirical data are always logically compatible with more than one scientific theory, so that the acceptance of a particular theory by scientists cannot be the result of the data alone. We pick up one theory rather than another, because we believe certain background assumptions. This means that no particular theory which is compatible with the data is supported by the data. As logicians may well recognize, logical compatibility is far too below than the required logical implication.

Under these circumstances, we should explain why scientists accept one theory rather than another by appealing to the social factors that make them accept certain back ground assumptions. For instance, consider a particular scientist doing research on a stomach disease which frequently leads to death. The scientist locates bacterium x in the patients, and treats them with an antibiotic. Those patients thus treated survive and others die. From this, the scientist concludes that bacterium x is the cause of the disease. To validly arrive at this conclusion, he also assumes that no other relevant germs except bacterium x were present. But such assumptions might be mistaken. It may turn out that all the people who developed the stomach disease developed it due to unusual sunspot

activity to which they were genetically susceptible. Here Barnes and Bloor point out that the scientist's predilection to accept bacterium x as the cause must have social causes². Perhaps the accepted view in the field is that all such diseases are caused by germs; so he will not gain respect if he questions this assumption. Third, history of science well depicts how sociological factors played a key part in convincing scientists to accept certain theories.

Looked at this way, the strong programme of Barnes and Bloor is appealing. However, it is not free from defects. Primarily it is found paradoxical; whatever is said by advocates of strong programme about other scientific theories also applies to it. If we accept that data by themselves cannot provide good reasons for the theories, the very empirical study also cannot provide good reason for opponents of the strong programme to change their beliefs. This means that if Barnes and Bloor are right, their empirical studies must be perfectly compatible with programmes other than the present one. Secondly, strong programme can only be part of scientific knowledge if it achieves widespread acceptance in the scientific community. If it is widely held in contempt by the scientific community, it seems it cannot be fully scientific. As of now, the strong programme is either held in contempt or ignored by most people.

In its attack on rationalism, the strong programme claims that it is more scientific than rationalism. This argument relies on a caricature of rationalism. The charges it raises against rationalism are the following:

1. It uses reasons rather than causes to explain rational belief.
2. It excludes sociological explanations of how scientists come to have certain belief.
3. It dogmatically relies on the conclusions of reputed scientists.

To commence with the first charge, while some rationalists separate the task of giving causal accounts of beliefs from the task of adducing reasons for them, many do not. A plausible and widely held view is that reasons are real causes that bring about beliefs as well as justify them. Secondly, producing social explanations of how scientists come to have beliefs on scientific matters is not incompatible with rationalism. The

2. George Convalis, (1997), *The Philosophy of Science*, Sage Publications, London, p. 148.

scientific community, it is argued, is so structured that the social factors and the personal interests of scientists are likely to induce them to arrive at truth. According to this view, far from being impediments to arrive at true knowledge, social influences and personal factors tend to make scientists more reasonable³. Regarding the charge of dogmatic relying on the conclusions of reputed scientists, it is said that the way in which eminent scientists have achieved their reputations makes it likely that their claims are more reliable than those of others. In fact, conventional assumptions have typically become conventional because the evidence for them is considerably stronger than the evidence for rival assumptions. The historical argument favouring the strong programme too is dubious. Advocates of the strong programme claim that scientists adopt beliefs because of social/personal factors alone. This is incredible. It may probably be the case that external factors do influence scientists to some extent. But the ever vigilant scientific community through constant repetition of experiments, makes all efforts not to permit these factors and forces a free play.

Even though the strong programme suffers from the above discussed drawbacks, its claim that science is importantly a social enterprise seems plausible.

Feminist Empiricism on Restructuring Scientific Community

Helen Longino, a known feminist philosopher joins with the view of strong programmists to the extent that external values of researchers and of the community often deeply influence what inferences can be legitimately drawn from data⁴. Longino distinguishes two kinds of values that play an important part in science: *constitutive values and contextual values*. The former are the norms which are generated from the goals of scientific inquiry. The latter are those that have a contextual role to play. Both these values affect the autonomy and integrity of science. Longino spells out her account by trying to show how contextual values can determine the constitutive values. For instance, the key feature which made mechanistic theories more attractive than their rivals was that

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3. Seed Hall (1988) *Science as a Process*, University Press, Chicago & P. Kitcher (1993) *The Advancement of Science*, Oxford University Press.
 4. H. Longino, (1990) *Science as Social Knowledge*, Princeton University Press, Princeton, p.40-59.

these theories presupposed that matter was an inert, lifeless substance whose activity was describable in mathematical terms. This feature enabled them to legitimate certain modes of interaction with the natural world like mining, and empowered them to control certain aspects of nature. By and large, the mechanistic picture of nature dovetailed with the rising capitalist class, which the rival pictures did not. In this way, the contextual values gradually transforms the constitutive values and the accepted assumptions of science. It came to be a constitutive value of science that an acceptable physical theory had to be instrumentally powerful. And it came to be a standing assumption of science that all things consist of an inert material substrate, the properties of which are qualitatively determinate.

For Longino, science is objective in the sense that scientific knowledge can be justified through inter-subjective agreement after following non-arbitrary procedures, and not in the standard sense in which objectivity brings along with it 'unvarnished truth'. The standard notion of objectivity is unattainable. For, the background assumptions in any case are potentially problematic. Her kind of objectivity requires that background assumptions be arrived at through shared procedures in a community. It is indeed very different from the Cartesian picture in which a lonely researcher strips away personal prejudices to examine the facts and reason out from them by *a priori* procedures. Longino specifies four conditions which a functionary scientific community should meet in order to be the sort of community that uses an objective method of inquiry.

1. There must be recognized avenues for the criticism of evidence, of methods and of assumptions and reasoning.
2. There must exist shared standards that critics can invoke.
3. The community as a whole must be responsive to such criticism.
4. Intellectual authority must be shared equally amongst qualified practitioners.

Longino points out that it is unlikely that conflicts between scientists which result from differing contextual values can be resolved by appeal to the data/inference from data to a particular theory. Such conflicts, she feels, eventually will have to be resolved through a choice of values. In her opinion, other things being equal, the choice should be made on the basis of the worthiness of the theories as bases for collective action

to solve common problems of a democratic and inclusive society, a society which includes women, blacks, and other oppressed people. As a feminist empiricist, she maintains that any theory to be worth considering, it must be consistent with carefully gathered empirical data, but choosing between two theories, she specifies, that one should adopt the feminist value of 'better justice to the more oppressed'.

To illustrate her point, she brings in the example of the conflict between two research programmes for explaining behaviour - the linear hormonal programme and the selectionist programme. In the linear hormonal research programme, the crucial determinant of behaviour is hormones which structure the brain while the child is in the womb. Gender differences in behaviour and cognitive preferences are largely ascribed to the effects of hormones in structuring the brain in foetal development. In the selectionist research programme, on the other hand, people have a large number of neural pathways which make a variety of behaviours possible. Through their interaction with the environment, some path ways are selected and reinforced.

Longino argues that the linear hormonal programme's picture of human behaviour is deterministic and tends to bolster the status quo by implying that the fact that there are few women working in mathematics and sciences is to be explained through women's natural infirmity in these areas. By contrast, the selectionist programme suggests that gender differences in capabilities and dispositions are to be primarily explained through social factors, and can be remedied by social action. Criticizing the linear hormonal programme, she questions whether it occurs in a social vacuum. The only benefit of such theories is that we are justified for not spending money on special programmes to improve women's performance in these range of areas. Even in a perfect society where human rights are well respected, say in United States, they are only committed to equal opportunity in employment in the sense of removing socially created obstacles, not naturally created ones.

How far Longino's feminist empiricism succeeds in restructuring scientific community is yet to be examined. Much of Longino's argument rests on the claim that we cannot use inductive reasoning to support a particular research programme without introducing potentially problematic background assumptions. True, inductive practices do not give us foolproof knowledge instances. But that does not suggest that

the method is not worth taking at all. Moreover, the sophisticated inductive reasoning we use in science is likely to lead us to truth. In short, if the aim of science is to get at the truth about the world, we are justified in using inductive reasoning rather than external value commitments. Further, it is important to note that there is nothing epistemologically compelling for the scientific community to use different value commitments to choose between programmes.

Further Modified Account of Objectivity

It is exactly here that Ismay Barwell intervenes in Longino's account of objectivity, which, according to her, though is partly correct, needs to be supplemented⁵. Like Longino, she too believes that a lovely scientist cannot be objective by adopting a bird's eye view. [One is here necessarily reminded of Putnam's persuasive argument to defy naive realism and claiming bird's eye view]. The background assumption of scientists are influenced by the contextual values and interests of the groups to which they belong. But Longino's ideal community will not deal with this problem. Why? She reasons out – A community of scientists who were all of the same gender and who had very similar social values and interests, might arrive at consensus concerning some theory. Yet the arguments for that theory will be poor in ways which are unnoticed by members of that community, because they are blinded by their ideological prejudices. To illustrate the point Barwell brings in Aristotle's assumption that mothers are merely there to provide matter for the foetus and do not contribute to the form of the child. Though the view was challenged by some Greek thinkers of that time, the Aristotelian view of the role of the mother came to be accepted through the consensus of the type of community which has an objective practice in Longino's sense. Yet we now recognize that Greek males of the time were deeply influenced by dubious assumptions concerning the inferiority of women and their inability to be the true cause of the generation of the form of human beings. Barwell argues that apart from the type of consensus Longino describes, a theory needs to be strongly objective in the way Sandra Harding describes⁶.

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5. I. Barwell (1994) 'Towards a defense of Objectivity' in K. Lennon and M. White Ford (eds) *Knowing the Difference*, London: Routledge, pp. 79-94
 6. S. Harding (1991) *Whose Science? Whose Knowledge?*, Cornell University Press, New York.

Harding's Intervention in restructuring scientific community

For Harding, a community of researchers can only be strongly objective when all background assumptions, cultural agendas and influences which determine data collection/inferences are rendered visible, and their power recognized in that community. These assumptions will be rendered visible only when critical perspectives from the standpoints of those who normally are not in the scientific community – such as women, blacks and the poor—are taken seriously as part of scientific debates.

The stand point epistemology Harding puts forth has a number of arguments behind it.

Researchers who speak from standpoints out side of the white, male, upper/middle class positions that have been dominant in the tradition are likely to uncover important data which have been lost to view because they are experienced predominantly by members of oppressed groups. For example, those who speak from the standpoint of women are much more likely to realize the importance of house work in the processes of economic production, and so to produce a better account of the workings of an economy. Moreover, people who speak from standpoints outside the mainstream will produce theories developed from those which are typical in a science, and so will provide valuable rival theories which allow us to understand the world in a different way. For example, Biologist Barbaro McClintock, who viewed of scientific research as a human and not a male enterprise, and thought of nature as having integrity and immense complexity, was able to make important discoveries in genetics.

If we bring together aspects of Longino's and Harding's accounts of objectivity in the way Barwell describes, science would be radically transformed. Scientists will practice their craft in a properly objective manner by becoming aware of many external influences on their work and by giving a great deal of authority to standpoints outside the main stream. Scientists should learn a great deal about the workings of societies, and about how to think as an intelligent member of a marginalized group. In addition, affirmative action to raise the number of scientists from various disadvantage groups will be useful, also because such groups are likely to speak from little-heard 'stand points'.

Harding's version of restructuring scientific community has some plausibility⁷. There is a good epistemological case to be made for changing the workings and membership of scientific communities. The precise way in which things should be changed, however, needs to be discussed. Scientists from a subaltern group may be more likely to produce illuminating new theories and bring hitherto unnoticed facts to light. However, it is also likely that they too will be influenced by their ideological prejudices, and so should not be any more epistemologically privileged than other scientists.

Feminism re-vitalizing Epistemology

So far we have been analyzing how feminism can revitalize epistemology, though no such mention of this point was made. Such a feminist motivated epistemology become increasingly necessary. Such an attempt can be viewed as reviving a sort epistemological value buried in the 17th century - a sympathetic understanding of the object. This means to merge with or marry that which is to be known. "Sympathetic thinking", Marcuse suggests "is the only mode which truly respects the objects, that is, which allows the variety of its meanings to unfold without coercion or too-focused interrogation"⁸. The deepest understanding of an object comes not from analysis of parts, but from placing oneself within the full being of an object, allowing it to speak. Both Cartesian epistemologies presuppose passivity of the knower. But while for Descartes passivity meant yielding to the authority of the object's own nature, for feminist thinking, the objective and the subjective merge, participate in the creation of meaning.

What is aimed at is not a rejection, but a re-revisioning of 'objectivity'. But the Cartesian ideals of 'detachment' and purification of understanding make any continuity between subject and object impossible. The spirit and the corporeal as diametrically opposed to each other and mutually exclusive to other's characteristics should give way to a conception of nature where the world is no more an 'it', but an entity with positive epistemic values.

7. I leave out major criticism raised against Harding's account as it is inessential for the development of the argument.

8. Marcuse

Epistemology Taking a Social Turn: Feminist Intervention

The cognitive ideal of the tradition from which modern philosophy of science developed, is the ideal of a lonely observer, totally putting aside external influences in order to examine reasoning practices and experimental evidence in the light of her intuitions. But of late, epistemologists have realized that such an ideal is not useful for creatures with our natural capacities and dispositions. That epistemology needs to take a social turn is the lesson the bygone century has given us.

It is also of interest to note here that, social epistemic practices like testimony, argumentation etc. are given a face- lift now.⁹ As we all know, testimony as a social epistemic practice has been looked upon with suspicion till very recently. And it is only in 1980s that Western philosophers have given a serious consideration to it. That social epistemic practices are to be brought into the main stream (along with individual epistemic practices) is a cry heard from different quarters. Epistemologists demand to meet the challenges of knowledge exploration. It is felt that individual epistemic practices should be supplemented with social practices to meet the demand.

Philosophy of science on its side points out that scientific knowledge necessarily takes place in social atmosphere. Though from the peripheries it looks as though science advances with individual observations and inferences, we often forget that testimony has a serious roll in it. Reliable scientific knowledge is arrived at by consenses in a particular kind of community which trains individual scientists, corrects their mistakes contains disciplinary structures for punishing poor reasoning and data gathering.

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9. Alvin I Gold man in his recent work *Knowing in a social world* discusses this issue.

Book Review

Felix Wilfred, *The Sling of Utopia. Struggles for a Different Society*, ISPCK, Delhi, 2005, pp. x+343. Price. Rs. 275.

The book under review titled *The Sling of Utopia* by Felix Wilfred, Asia's renowned scholar and India's avant-garde liberation theologian is a groundbreaking volume. No wonder, for it bears the imprints of the sharp slings that emerge from grassroots' resistances and struggles, arrows that are reminiscent of the sling of David. It clearly and deftly sets the tone for a dynamic and refreshing theological encounter between context and content, the universal and particular, life issues and current day political and scientific theories, be it globalization, nationalism or biotechnology. From the energizing dialogue what ensues is a promised land of new dreams and hopes, of prospects and possibilities, of potentialities and discoveries.

Rich in imagery the words almost flow out with a compelling urgency, drawing the reader's attention to the glaring fact that "gripped by insecurity and devoid of hope the world is now too dangerous for anything less than Utopia." (Page 1) Utopias are the living dreams of the masses and therefore there is a life and blood texture to them. The utopias of the past however, as the author suggests, cannot come to our aid, "because they were steered by elites who exploited the poor for their vested interests." "Much of these revolutions," the author poignantly remarks, "are not a revolution of the people, but manufactured for the people by others who reap the benefit as the tyranny and terror that followed many revolutions in the past amply demonstrated." (Page 3) On the other hand the utopias of the masses are spun, woven and interlaced from a different fabric, as the author spells out. "Confrontation with human suffering and response in terms of compassion has developed in the victims some of the values we require to sustain a different world – solidarity, humanness, the spirit of sharing, the technique of survival,

readiness for risk-taking, endurance and steely determination in the midst of adversities.”(Page 5) These values and perceptions, which have got crystallized in their culture of everyday resistances, become the resources and the loom, which weaves the utopia of the new order.

The chapters abound in lively symbolism linked by a constant quest, the composition is multifaceted like a seer’s eye; and that is why Felix Wilfred is a visionary, an inspiring and natural writer. In the book’s landscape there is direction and perspective, moving horizons and promises. The true value of the work lies both in its representation and in the trajectory that it envisions. It captures with a prophetic candor, the facts of everyday life of the marginal people in a world caught by the throes of globalization and other false utopias created by the vested interests of the dominant classes. The utopias of the masses, which are of a different grain, emerge from their pain and struggle. The poor thus are agents who usher in a New World order. This is the trajectory, the dynamic sketch of a harmonious global design that the author cuts out.

The book contains three parts. The first section identifies concrete issues like globalization, identity politics, nationalism and the minority problematic, which are used as prisms for analyzing society. Running into four chapters this section is both diagnostic and exploratory. It critically examines the ways in which currently prevalent theories and practices come to our aid in moving towards viable solutions for the affected masses. This section also emphasizes the urgency of rethinking nationalism in our country today by problematizing the manner in which elites in our country have defined nationalism in terms of their own vested interests.

Part two is path breaking as it gives us certain novel perspectives on religion. Chapter five in this section deals with the very down-to-earth ways in which the subalterns experience religion. Their encounter with the *source of all life* emerges out of a different kind of pathos, of a passion born out of struggle. The significance of their religious experience thus transcends the merely religious realm. As the author puts it, “Their religious experience is in fact also a social, cultural and political capital.” (Page 16) The author thus draws our attention to the need for developing cultural resources for understanding and communicating, a significant one being the *art of negotiating across the various borders*. When understood in such a wider sense, religions become wellsprings, the

womb that churns out a new humanity. The next chapter in this section explores into the promises subalterns' manner of experiencing the sacred, holds for encountering this new *avatar* of capitalism - globalization and its varied manifestations. The third chapter in this section deals with yet another related concern of great contemporary significance, the topic of martyrdom, which has its ideological and motivational roots in all major religious traditions but has today 'larger social and political ramifications.' With the sharp-edged scrutiny of a critic whose mind and heart are set on social transformation in view of the ordinary masses, the author makes an analysis of the diverse and alternative manifestations of martyrdom that have been part and parcel of the histories of nations and communities. He thus calls our attention to the many innocents who are subjected to death often for no fault of their, the numerous 'missing' women and children who survive and pass out of our world silently as faceless entities. It is significant then that the author dedicates this book to the memory of his beloved sister Prema, who departed from this world in the prime of her life. Describing her magnanimous person and the largeness of her heart, Wilfred says, "No one ever heard a harsh word from her. Hospitable in every fibre of her being, and ever solicitous to the needs of others, she loved much; was loved even more." (Page x) Most women of our country die such innocent deaths, offering their selves in totality for the uplift of their families, children and thus to society, dying a million times to themselves. Chapter seven thus does justice to the voices of such martyrs whose stories often remain untold. This voice of solidarity that the book carries in all its chapters speaks for the credibility and relevance of the discourses inscribed in the pages of this work.

The third part sketches certain important issues that the Christian community should engage itself with. In the five chapters of this section, vibrant and controversial themes like secularism, minority rights and obligations, Christian higher education, consumerism and the subject of well-being giving it a material and this worldly impact, is dealt with. There is a clarion call to the Church here to which the Church of India would do well in listening. The tone of the book is thus rife with challenges and pointers to society at large and the Indian Church in particular.

It is worth mentioning that this ISPCK publication saw the light of day with the emergence of the New Year 2005. For us who are facing

the onslaughts of the Tsunami surge, with 200,000 of our people washed out, and 1.5 million of our children rendered orphans and homeless, the world stands in need of heralds who can bring the message of hope and good will. The timeliness of this book then is prophetic, just as the author's urgent voice behind the lines is commanding, for it bears the utopian slings of those whose voices are unheard and stories untold.

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I. J. Constantine Manalel, hereby declare that the particulars given above are true to the best of my knowledge and belief.

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